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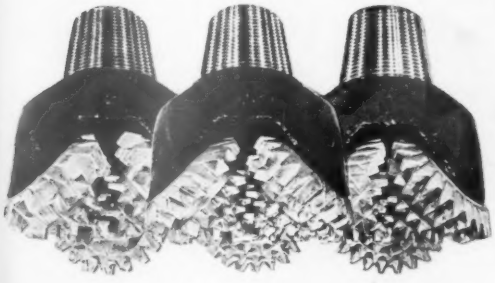

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XUM

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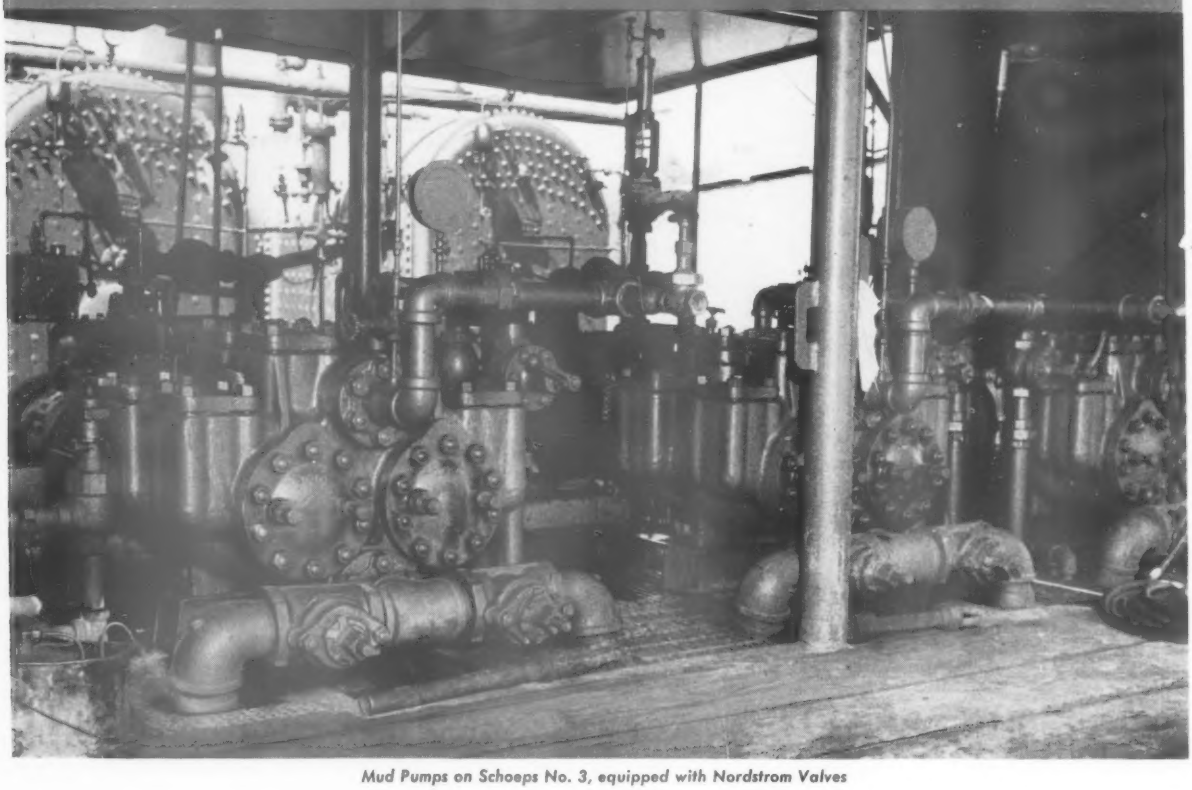
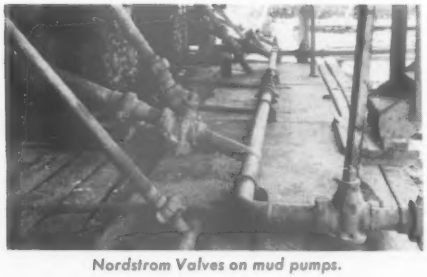


*Mud Pumps on Schoeps No. 3, equipped with Nordstrom Valves*

## EQUIPPED WITH

# Nordstrom

## LUBRICATED VALVES



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*Nordstrom Valves on engine line of mud pumps.*

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# the OIL AND GAS JOURNAL

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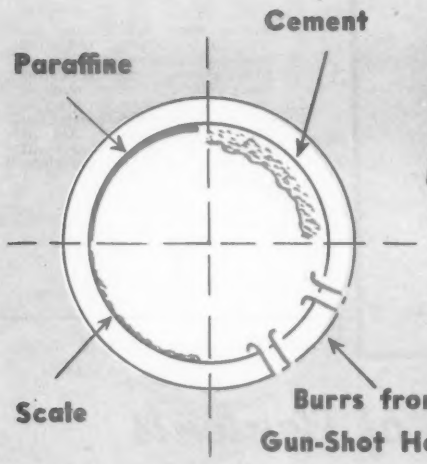


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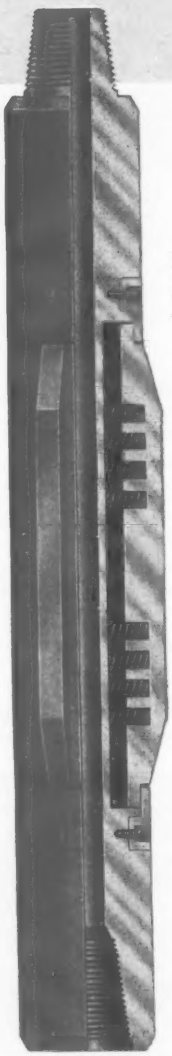

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Baker Rotary Casing Scraper

**BAKER OIL TOOLS, INC.**

Houston—LOS ANGELES—New York

the OIL AND GAS JOURNAL

# Trends

Crude-Oil Production
By States—Page 134

**CRUDE-OIL STOCKS** 215,417,000 bbl. as of Sept. 22—up 937,000 bbl. One year ago 221,490,000 bbl.

**GASOLINE STOCKS** 82,901,000 bbl. as of Sept. 22—down 2,308,000 bbl. One year ago 77,123,000 bbl.

**RESIDUAL FUEL-OIL STOCKS** 47,601,000 bbl. as of Sept. 22—down 869,000 bbl. One year ago 62,533,000 bbl.

**GAS OIL AND DISTILLATE STOCKS** 43,620,000 bbl. as of Sept. 22—up 113,000 bbl. One year ago 43,175,000 bbl.

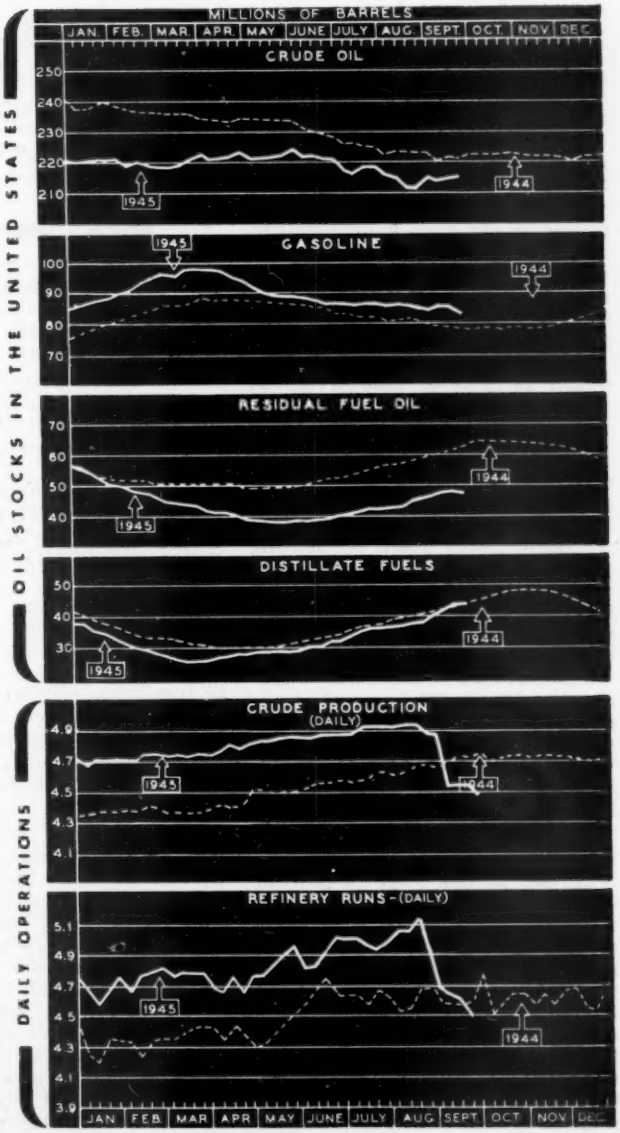
**CRUDE-OIL PRODUCTION** 4,481,150 bbl. as of Sept. 29—down 56,200 bbl. One year ago 4,758,200 bbl.

**REFINERY RUNS** 4,499,000 bbl. daily week ended Sept. 22—down 117,000 bbl. One year ago 4,657,000 bbl.

NEW and greatly expanded research-laboratory construction projects are being announced almost weekly by various oil companies. That the laboratories are going to be kept busy is obvious from the eagerness with which all the scientists and technologists of the industry are scanning their technical and scientific literature these days. The reason for eagerness is that the lid of military secrecy is being lifted from one weapon after another. Most of these projects depended for their success on vastly improved and enlarged technological development of previously known scientific discoveries. In most instances what happened was that the normal development of 5 to 25 years was squeezed into a matter of months.

SINCE these projects generally involved large-scale manufacturing and processing, many individual parts of them can be adapted for use in the petroleum industry, often with only minor changes. For instance, all workers in our highly mechanized industry are interested in automatic controls: geophysicist, drilling contractor, production man, pipe liner, refiner, and marketer. The war projects advanced the progress of electronic controls by 10 to 25 years. A vastly expanded electronic industry is now seeking markets for its new products, and the oil industry will find uses for many of them.

THE secret of the radio-controlled artillery shell has been revealed. This has a radio built into the nose, with tiny but powerful radio tubes and storage batteries, so strong they can withstand the impact of being fired from a gun. Improved and rugged storage batteries will certainly find uses in the oil industry, and quite possibly such sturdy radio tubes will be found useful. Physicists in the petroleum industry seem much interested in one byproduct of the atomic bomb. Large-scale production of synthetic radioactive elements, at a cost of about a thousandth that of prewar methods, is possible. The possible fields of application they mention for these new products in the petroleum industry are so many and varied they sound fantastic. But the engineers and equipment manufacturers take them seriously and talk about important developments within a year or two. Every branch of the industry seems to have a great many places where these new radioactive elements can be put to work very quickly.



# Britons Suggest Scope of Bilateral Oil Pact Should Be Expanded

***by C. O. Willson***

**In this story, cabled to the Journal by its editor, who was in London for the conference between British and American representatives on the international oil pact, are summarized expressions of the British press regarding the terms of the agreement. Chief among the suggestions offered is that the bilateral accord should be extended into a multilateral treaty, to include other petroleum producing and consuming countries. Analysts assert that the future British petroleum policy is largely dependent on what is done in matters affecting dollar-sterling exchange and credits.**

LONDON. (By cable).—Emphasizing that the Anglo-American petroleum agreement signed here September 23 must be expanded to include other countries, the London press and local oil men comment approvingly on the accord reached by representatives of the United States and the United Kingdom. Informed observers say financial and trade discussions now under way between the two nations will determine what can be done in solution of mutual problems.

Expressions during and since the conference have stressed the international scope of British oil operations, which, it is argued, necessitate extension of the bilateral agreement, if it is approved by the U. S. Senate, into a multilateral treaty which will include other petroleum producing and consuming countries. At the same time analysts point out that the future British petroleum policy is largely dependent on what is done in matters affecting dollar sterling exchange and credits.

The following extracts from editorials of leading London papers summarize viewpoints.

Daily Telegraph and Morning Post.—"As far as Britain is concerned, the agreement does nothing to hinder and may help to promote the development or expansion of sources of supply within the sterling area. The success of the agreement depends predominantly on the willingness of other oil-producing countries to join, for clearly no pact could hope to achieve very much which excluded so important a producer as Russia. The present agreement, like its forerunner, envisages an international conference with a view to a multilateral pact of general application, and that perhaps is its most useful proviso."

Financial Times.—"Britain retains freedom of action, which is doubly important at this stage of postwar developments. There will be no restraint upon expansion of existing oil undertakings upon which we may need to rely in greater measure that in the past in view of our foreign exchange position. The agreement implies that the industry is free to carry on its legitimate trade with the understanding that the principle of equal opportunity shall be applied to new acquisitions. We can rest assured that the British section, our special concern, will rise to its responsibilities as well as seize its opportunities of assisting this country in this new time of need. At the same time it is necessary to remember the broader international aspects of the situation in regard to which it is agreed that collaboration of other producing countries, as well as consumers, shall be sought."

### Article 7 Deemed Vital

The Economist.—"From the British viewpoint, perhaps the most important part of the document is Article 7, in which the signatory governments agree:

"'(a) That the general purpose of this agreement is to facilitate the orderly development of the international petroleum trade, and that no provision in this agreement, with the exception of Article 2, is to be construed as applying to operation of the domestic petroleum industry within the country of either government.

"'(b) That nothing in this agreement shall be construed as impairing or modifying any law or regulation, or the right to enact any law or regulation, relating to the importation of petroleum into the country of either government.

"'(c) That, for the purpose of this article, the word "country" shall mean:

"'1. In relation to the Government of the United Kingdom of Great Britain and Northern Ireland, the United Kingdom, all British colonies, overseas territories, protectorates, protected states, and all mandated territories administered by that government.'

"The agreement itself neither infringes the principle of equal opportunity for British producers nor their freedom to establish refinery industries. On the other hand the agreement does clarify the position of certain areas in the Middle East which are politically independent and in which Britain and the United States have joined interests.

"In sum, the new agreement does not seem to prejudice British interests, and eventually it may form the basis of a world oil compact. Pending negotiations of a multilateral agreement it can hardly alter the status quo."

The influential London Times before and during the discussions here took a somewhat negative attitude toward the agreement, with the contention that it left the United States petroleum industry free to operate without restrictions while controls were to be placed on British operations. Following the ratification the daily issue of the Times gave its partial approval after explaining the workings of the commission which is to be established. The editorial concluded:

"Its proposals will not be binding on either the signatory governments or their nationals, and the role it envisages is entirely consultative. This is in no sense a plan for the international regulation of oil trade, but by providing a clearing house for ideas, information, policies, and disputed questions concerning concessions and development rights, the agreement, if ratified, may nevertheless serve a valuable and necessary purpose."

The stress placed on future petroleum operations within the sterling area in these comments may come as a surprise to oil men in the United States who do not appreciate the importance which the British attach to the financial and trade discussions in Washington, headed by Lord Halifax and Lord Keynes for the United Kingdom. The newspapers feature the Washington developments daily, and discussions are general as to changes that will be necessary in British economic policies should satisfactory agreements not be consummated.

As regards petroleum, it is pointed out that the production of sterling areas can be expanded to take care of United Kingdom requirements so that imports from dollar countries can be ended. In this connection reports have been released showing petroleum imports into the United Kingdom the first 6 months of this year averaged 428,000 bbl. daily. Less than 4 per cent of the total was crude oil. The remainder was products. No information was given out as to the source of imports. They came largely from the United States and other Western Hemisphere sources.

With lend-lease termination, new imports from the United States have largely ended. The present peacetime requirements of the United Kingdom are indicated from reports, which show that imports averaged 265,000 bbl. daily for the first 6 months of 1938. Nearly half of the 1938 imports came from the United States.

It is pointed out that should no substitute arrangements be made for lend-lease, dollars will not be available and United States suppliers will not be able to resume their prewar position in United Kingdom petroleum markets.

Government officials are being urged to increase shipments from Iran and other sterling countries. The production of Iran, where Anglo-Iranian Oil Co., Ltd., a British concern, is the sole operator has been increased to nearly 400,000 bbl. daily, approximately twice the prewar output. Before the war very little Iran petroleum was imported to the United Kingdom because the output was needed in the general area where it is produced and because of the shorter shipments here from the Western Hemisphere. The same reasoning in regard to Britain getting future petroleum supplies from sterling areas is being offered in support of an expanded refining industry, which in the prewar period supplied less than 25 per cent of United Kingdom requirements.

As part of this sterling program, an expansion in British facilities for manufacturing equipment and materials is being urged.

The foregoing is a summary of the British program to which obviously there are limitations as to what can be done. It is conceded that a 100 per cent sterling operating program would result in long delays and restricted supplies of equipment of all kinds. The operating oil companies are hopeful that a program which in general will reestablish prewar petroleum arrangements between the United States and Great Britain can be worked out immediately, with a long-range program developed as conditions justify.

# Davies Plans to Return to Duties With Standard of California

***by C. O. Willson***

LONDON (By cable). — Ralph K. Davies, who has headed the petroleum activities of the United States as deputy coordinator and later deputy administrator and who has been here with Administrator Harold L. Ickes, in charge of the American delegation which negotiated the new Anglo-American petroleum agreement, expects to return soon to his duties as vice president of Standard Oil Co. of California. This intention was explained in a discussion with the writer, who has taken advantage of the presence here of oil men to obtain information on recent developments in United States oil.

In answer to a query as to his own plans after he had explained the rapid liquidation of Petroleum Administration for War now under way, Davies said: "You know I am on leave from a job. I shall return to that and go to work."

There was no discussion of reports that he would be asked to head for a time the joint commission which will implement the oil agreement, provided it is approved by the U. S. Senate.

Members of the American delegation agree that Davies is entitled to major credit in gaining approval of the revised pact. He is well known among local oil men because of his residence here several years ago in connection with marketing activities of his company. Officials of English companies praised the manner in which he presented the agreement as assistant to Ickes. Trade-journal and newspaper writers have expressed appreciation of the factual manner in which he explained objectives of the agreement.

Davies started his oil career as a field clerk in Bakersfield, Calif., some 30 years ago. His ability attracted attention and he rose rapidly in the Standard of California organization until he became senior vice president. In the spring of 1941 he took leave of absence to join Ickes in the task of mobilizing the petroleum industry for the war both men felt was inevitable.

Oil men and military authorities join in saying he has performed an outstanding job with a small but efficient staff. Davies insists that most of the credit belongs to the industry, asserting it did the major task with his small organization, serving as a liaison and coordinating unit. Oil men in turn commend Davies for his organizing ability, the smooth coordinating machinery he helped build and the strength of character he displayed when faced with difficulties.

## California Reducing Crude-Oil Output

LOS ANGELES.—Despite Petroleum Administration for War's recommendation that California crude-oil production for October be retained at 886,000 bbl. daily, because of anticipated demand, the California Conservation Committee voted to adopt a subcommittee's report recommending an allowable of 826,000 bbl. daily, based on engineering principles.

Shell Oil Co., Inc. started reducing production during September by cutting back 2,000 bbl. per day at Ten Section, 5,000 bbl. daily at East Coalinga, and about 3,000 bbl. at Ventura Avenue. Other companies have effected smaller reductions in various fields but the major reduction will be effective in October and it is quite likely an additional reduction will be made in November.

Many companies have felt that the high production rates that prevailed during the war period would prove injurious to reservoir pressures if continued, and are quite willing to reduce production to what is considered good engineering practice. The initial reduction will be in that group of fields having flush production, but eventually the reduction will be extended to some other fields which may be in the pumping stage.

On October 1, California conservation work reverted to voluntary curtailment to take care of greatly increased additions to storage. The Conservation Committee recognized that stock increases have not yet become an important factor but felt that production should be reduced now to keep future stock increases to a minimum during the winter.

The effect of strikes on production is problematical but if refineries remain tied up for any indefinite period of time, pipe-line runs must be reduced. This will be reflected in production, since field storage is usually limited. No cognizance was taken of present unsettled labor conditions in setting the October allowable.



XUM

# Government Tries to Bring Oil Companies and Strikers to Terms

WASHINGTON.—Although neither representatives of the Oil Workers International Union nor of the oil companies offered any clear signs of yielding, hope was expressed by Edgar L. Warren, chief of the conciliation service, that an agreement would grow out of the oil-strike conference in session here this week. Warren indicated a belief that the companies might offer some sort of compromise that would pave the way for a settlement.

Lewis B. Schwellenbach, secretary of labor, asked the strikers to go back to their jobs on a 40-hour-week basis at an increase of 15 per cent in the basic rate of pay. Oil companies already had offered this increase before conciliation meetings, called by the Government, had been going on for a week.

Twelve states directly affected by the oil strikes are Texas, Ohio, Indiana, Michigan, Illinois, West Virginia, California, Massachusetts, Oklahoma, Kansas, New York, and Pennsylvania.

Pending big-scale stoppages in California were announced by representatives of Union Oil Co. of California and Shell Oil Co., Inc. They said new moves by the Oil Workers International Union threatened their operations with complete shutdown.

Schwellenbach has declared agreement must come quickly or military fuel will run dangerously low. White House officials have stated that seizure is a possibility if the Army and Navy certify that the fuel shortage is hampering military operations.

Shell and Union spokesmen said that the union has served ultimatums on both firms that its members would walk out unless granted a 35-cent hourly wage increase upon the companies' return to the 40-hour work week.

Wendell Thayer, of Los Angeles, wage executive of Union Oil, said the union gave notice it would strike at the firm's biggest two refineries—at Los Angeles and at Radeo, Calif., on San Francisco Bay—unless the demand is met.

An identical telegram sent by Petroleum Administrator Harold L. Ickes to the Oil Workers International Union and to officers of oil refineries says:

"I have been informed by Army and Navy that this nation cannot afford losses in military production anywhere near the magnitude of those presently being experienced as result of refinery shutdowns over the nation. Not only is the return of military troops to this country being slowed down by these losses but the very security of our armed forces and our military position is threatened. I would also point out that any extensive shutdowns of petroleum distribution or transportation facilities will have most serious effects upon continuity of services essential to health and safety of our people as well as delivery of war products for urgent military need."

Charges that the oil workers who have called strikes at Kansas City, Kans., and Okmulgee, Okla., are "completely violating a solemn promise not to strike for the duration of their agreement" were issued by Frank Phillips, chairman of Phillips Petroleum Co., and K. S. Adams, president.

### Company Had Agreement

The statement recalled that the company had made an agreement with the Kansas City union which extended until September 30 of next year.

"The action of the local union at Kansas City is plainly a part of the national plan whereby the Oil Workers International Union is undertaking to paralyze completely all operations within the refinery industry, with the main purpose of enforcing their demands for obtaining 52 hours' pay for 40 hours' work," the statement said.

"Under wartime conditions the company, along with the rest of the refining industry, has been scheduling a work week of 48 hours, paying time and one-half for the hours in excess of 40. This has given employes 52 hours pay for 48 hours worked.

"The contract presently in effect with the union at the Kansas City refinery calls for a 48-hour work week and thus far there has been no movement by the company to reduce the work week or the employes' take-home pay. The availability of experienced refinery workers is insufficient to permit an immediate reduction in the work week and at the same time maintain full operations, but it is expected that when the work week can be reduced such reduction in the hours will be accompanied by upward adjustment in the base pay rate.

"The untimely and ill-considered action by the union can only impede and delay solution of the problems that surround a return to normal peacetime operations which are necessary to provide the public's requirements for petroleum products and to produce stable working conditions and wage rates. The company's refinery at Kansas City has, since its acquisition in 1930, been expanded more than fivefold in capacity and its personnel has been enlarged from about 200 employes to over 800.

"We are deeply conscious of our responsibility to the users of petroleum products in this area and regret that under the present circumstances we will be unable to continue service without interruption."

# Carter Helped Develop Radio-Proximity Fuse

SPECIAL work begun in April 1942 by Carter Oil Co.'s research and development organization in Tulsa resulted in perfection of the radio-proximinity fuse which is rated second only to the atomic bomb in winning the war. The so-called VT Fuse Project was assigned to Carter's Tulsa laboratory by the Office of Scientific Research and Development and was carried forward under direction of Dr. M. A. Tuve of that organization. The VT fuse is described as "a detached brain for explosive projectiles" and was used in antiaircraft shells.

The VT fuse may be said to convert antiaircraft fire into a game of horse shoes in that it makes the close ones count. The projectile contains among other things a complete radio sending and receiving set arranged in such a way that a radio signal is continuously emitted while the shell is in flight. If a shell passes near a plane, a weak signal is reflected back to the shell and received by it and instantly causes the shell to explode.

No official information is available on effectiveness of the VT device because the general policy is to tell people only what they need to know in order to get the job done.

Carter's principal task in connection with the development of the VT fuse has been to provide devices within the projectile which will positively prevent accidental explosion of the shell in the magazine of a ship, in the bore of a gun, or at any time until the shell is on its way and has traveled a considerable distance toward the target.

The major difficulties in working out devices for this purpose are the extremely limited space available for the purpose and the very large forces which the device must withstand without injury when the shell is fired from the gun.

# THIS WEEK

**RESEARCH**—Egloff says needn't worry about atomic energy supplanting oil products for another generation. . . . "Enormous research and development" necessary. . . . ¶Massachusetts Institute of Technology to establish gas-turbine laboratory. . . . Will include supersonic wind tunnel and facilities for research in elements of compressors, combustion devices, etc. . . . ¶Methane (will-o'-the-wisp of marshlands) has been liquefied, processed by secret method, and used to drive a bus in Scunthorpe, England. . . . ¶Development of an acoustic analyzer enables scientists to determine purity of natural gas by listening. . . . Resonating tube registers purity by means of characteristic pitch. . . . ¶Now revealed 500,000 bbl. 130-octane gasoline being produced daily when war ended. . . . In prewar days 100-octane was supposed last word in antiknock fuels. . . .

**PRODUCTION**—Nation's daily crude output drops to lowest level since April 29, 1944. . . . Down 56,200 bbl. to a total of 4,481,150. . . . California registered heaviest loss, 25,600 bbl. . . . Illinois next with 15,350. . . . Michigan, Oklahoma, Wyoming report shrinkages. . . . ¶Week's completions 583, down 16. . . . ¶World's deepest hole abandoned by Phillips Petroleum in Brazos County, Texas, at 16,665 ft. . . . No commercial production. . . . ¶Mississippi has natural-gas reserves to supply state's present rate of demand 793 years, DeGolyer assures. . . .

**WASHINGTON**—Davies indicates intention returning soon to vice presidency California Standard. . . . Reports persist Ickes, too, wants to return to private life. . . . Both men now in Europe. . . . ¶Rumors mention Arthur Krumm, California lawyer, as likely to succeed Ickes as interior secretary. . . . ¶Truman issues proclamation U. S. has jurisdiction over oil and other minerals in submerged continental shelf off all coasts. . . . Pushes American claims beyond traditional 3-mile limit. . . . No connection with dispute over tideland oil rights. . . .

**CONSTRUCTION**—Natural-gas industry expects to spend $160,000,000 in expansions during coming year. . . . About 5,000 miles of new pipe line in prospect. . . . ¶California Standard announces $36,000,000 construction and expansion program. . . . Tanker fleet to use $13,000,000.

**TIRES**—Survey shows 71 per cent motorists begging for new tires, compared with 31 per cent concerned about new cars. . . . Brakes come next as subject of uneasiness, 23 per cent. . . . Only 10 per cent worried over steering gear. . . . ¶Synthetic-rubber tires declared superior in some respects to prewar tires of natural rubber. . . . Much learned through manufacturing experience during war. . . . ¶Tire manufacturers released from government control over size and kind, but must stick to one quality in each size. . . .

**TAXES**—Texas officials apprehensive over probable shrinkage of revenues for schools and highways as result of reduced gasoline-tax receipts attending protracted refinery strikes. . . . ¶Of $16,015,733 in severance taxes collected by Louisiana last year $13,344,804 was from oil. . . . ¶Ten-year billion-dollar program, requiring 3-cent increase in state's gasoline tax, advocated for construction of superhighway system in California. . . .

*On the eve of a conference called by U. S. Conciliation Service, leaders of C.I.O. Oil Workers International Union met informally to prepare "battle strategy." Shown here are E. C. Conarty, secretary-treasurer; O. A. Knight, president; E. Carl Mattern, vice president, and A. R. Kinstley, vice president*

Acme Photo

# Witness Tells FPC "Monopolistic" Contracts Were Offered

KANSAS CITY. — "Monopolistic and exclusive" contracts have been executed by natural-gas distributors in the Hugoton field, according to William Broadhurst, testifying September 26 before Federal Power Commission at the closing day's session of its investigation of the natural-gas industry. The hearings, which began here September 18, will be resumed in Oklahoma City October 9.

Broadhurst, who is vice president and treasurer of Helmerich & Payne, oil and gas producers of Tulsa, submitted a contract he said had been offered his company by Argus Gas Co. of Omaha, but which was not consummated.

He said the contract in effect would have bought gas at about 2 cents per 1,000 cu. ft., 2 cents less than the price paid to other producers. He identified the Argus company as part of Northern Natural Gas Co., also of Omaha.

Broadhurst testified the contract would have required his company to dedicate total production from certain of its wells to Argus' markets for the life of the field. This, he said, would have forced his company to maintain a gathering line for the life of the field, which in effect would reduce the sale price from the 4 cents stipulated in the contract to about 2 cents.

A letter to Helmerich & Payne from Panhandle Eastern Pipe Line Co., introduced as evidence, refused to consider purchase of gas from a Helmerich & Payne well close to other Panhandle Eastern production and lines.

Milton M. Kinsey, president of the St. Louis Board of Public Service, declared: "We are against restrictions on the exportation of gas. If Texas prohibits the export of its natural gas to Missouri, Missouri may in turn prohibit the export of its lead and zinc to Texas."

Kinsey told of efforts by his city to obtain straight natural gas—it now uses a mixture of natural and manufactured gas—and pointed out that such straight gas would permit cheaper rates and an increased use of gas.

"We are against restrictions on the end use of gas," he said, "unless it is shown that it is a matter of grave national concern."

He said he believed FPC should have control over extensions of pipe lines but added that some kind of regulation, "preferably state regulation, should be placed in effect over the individual sales by pipe lines."

During the Kansas City hearings, more than 90 exhibits were filed with the FPC by witnesses from Oklahoma, Louisiana, Texas, Kansas, and Missouri. Railroad, coal, labor, and other groups also were represented at the hearings.

The meeting at Oklahoma City will be followed by hearings at New Orleans and Dallas, before the commission moves to the eastern fields for further study. Final hearings are expected to be held in Washington early next spring.

FPC called the hearing at Kansas City as the first of a series to evaluate present natural-gas resources, probable fields as yet untapped and necessary steps, if any, needed to conserve the fuel.

## Mississippi's Oil Industry Employs 13,000 Persons

JACKSON.—Much has been said about the millions of dollars spent in developing the oil resources of Mississippi, but few references are made to the number of persons engaged in this industry—persons who are buying homes and rearing children. This led Governor Thomas L. Bailey to make a survey. Reporting the results of the survey, the governor says:

"Over 13,000 persons are directly employed in the producing department of the oil and gas industry, and they are scattered in 30 of the 82 counties of the state. The great majority of them have been here since 1939. Of these people 6,050 make their homes in nine Mississippi cities; 4,350 work on or service the 87 drilling rigs; 1,514 live out in the producing fields; 736 are employed on the 87 geophysical crews; 275 work on the few oil pipe lines and 75 work directly or indirectly in the state's one refinery.

# U. S. Claims Oil and Mineral Rights in Continental Shelf

WASHINGTON. — All petroleum and other mineral rights in the so-called continental shelf extending into the ocean for 100 miles or more in some places has been claimed for the United States Government in a surprise proclamation issued by President Truman.

This sets a new precedent in international law, as heretofore no nation has claimed jurisdiction of the ocean bed beyond territorial limits.

The effect of this proclamation on production of oil from tidelands along the coast of California and the Gulf of Mexico is problematical. An accompanying statement issued by the White House declared that it "does not touch upon the question of federal versus state control". However, there may be significance in the timing. The proclamation was issued only a few days after the House passed a resolution denying all federal claim to lands or their mineral content underlying the ocean or navigable waters and affirming the rights of the states to grant mineral leases and otherwise dispose of such lands. The Senate judiciary committee was scheduled to take up this resolution within a few days. It is not impossible that the new principle embodied in the proclamation may delay or sidetrack Senate consideration.

A second proclamation made similar federal claims to jurisdiction over fishing rights in coastal waters beyond the traditional 3-mile limit, but it was stated that neither proclamation was intended to disturb the rights of all nations to navigate such waters. Accompanying executive orders gave the Secretary of the Interior authority to control fishing and mining operations within the proclaimed jurisdictions.

On the face of things it is legally possible that the states may continue to exercise jurisdiction over oil production between the tide mark and the 3-mile international boundary while the federal Government exercises jurisdiction over navigation in this belt and over fishing and mineral operations between the 3-mile limit and the edge of the continental shelf. Such a situation, however, could easily lead to disputes unless Congress passes clarifying legislation.

The continental shelf is defined as extending out to where the water is 100 fathoms (600 ft.) in depth. This averages 18 to 25 miles offshore along the Pacific Coast and 200 miles or more off parts of the Atlantic and Gulf Coasts. There has never been any attempt to extract oil or other minerals from the ocean bed beyond the 3-mile limit, but the proclamation is based on the theory that technology may soon advance to the point where such might be attempted.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

# The International Oil Agreement

MOST oil men, British or American, who have studied the Anglo-American petroleum agreement signed in London last week appear pleased. It is predicted that both the Senate and Parliament will approve the pact. The only compulsory features are that both governments must grant equal opportunities to acquire exploration and development rights, and both must respect all existing valid concessions and lawfully acquired rights.

For the United States, the document imposes no obligations that have not been long established as legal principles and public policy in this country. For the British, the only new thing is abandonment of certain restrictive practices in regard to equal opportunity for exploration and development. This was not too difficult for them. In a changed world, such restrictions are outmoded. Their continuation probably would end in weakening British industry by attempting to shield it from wholesome competition with alert and progressive rivals. The present status of the English steel industry illustrates this very vividly.

It should be emphasized that there is neither victor nor vanquished in this agreement between the two nations. Neither outmaneuvered the other or drove the sharper bargain. Both agreed to it because both expect to derive real benefits, without harm to anyone else.

All other phases of the agreement are on a voluntary basis. This is an important point. It is a direct outgrowth of lessons learned in this country from operations of the Interstate Oil Compact Commission. That commission's experience has taught one great lesson, namely, that sovereign governmental units can cooperate freely with each other and with private industry to the benefit of all concerned. Just as there is no necessity for compulsory or coercive powers that would infringe on the sovereignty of states in the Union, so too there is no need for such powers in enterprises requiring the concerted action of sovereign nations. What works among sovereign states will work among sovereign nations.

The present agreement recognizes that other countries should be brought within its scope. This is of special interest to many South American countries and to Middle East governments. To attract them, the agreement lays stress upon the fact that consideration must be given to the economic advancement of the producing countries.

In this country, states in which oil is discovered for the first time turn to the Interstate Compact Commission for information about the type of legislation they should adopt to encourage sound development of this natural resource. They find a wealth of practical experience freely available to them.

Oil men believe that the proposed international commission will soon serve the same purpose on an international scale. In countries where oil exploration and development are new, the government officials now are hampered by a lack of knowledge of what is reasonable and what is unreasonable in the way of legislation. Soon they may have an international body to which they can turn for unbiased advice.

The Anglo-American pact is an example of an international working program arrived at by cooperative effort, rather than by devious diplomacy.

MIDDLE EAST REPORT *from the* EDITOR

# Five Fields With 51 Wells In Iran Produce Total of 365,000 Bbl. of Crude Daily

***by C. O. Willson***

MASJID-I-SULAIMAN, Iran. — At this headquarters of the Anglo-Iranian Oil Co., Ltd., "Fields" organization where one of the world's most important oil discoveries took place in May 1908, an oil-production operation is now being directed which has no duplicate in petroleum activities. In five active fields which are located in an area which extends over a northeast and southwest trend in southwest Iran, a distance of approximately 160 miles, 365,000 bbl. daily of crude oil are being produced from 51 wells.

All of this production at present is being refined at the Abadan refinery of the company located at the head of the Persian Gulf. This refinery is connected to the fields by a number of pipe lines, part of which operate by gravity flow. All of the producing fields represent major reserves with two additional proven fields awaiting development. Exploration work which has been consistently carried on over a period of many years, points to additional discoveries. All of the present production in the form of finished products from the refinery had a direct tiein with the Allied offensives in the Pacific, either in the form of military products or essential civilian consumption.

*Map of southwest Iran, showing location of fields, oil pipe lines, and refinery*

*Drilling well in Agha Jari field*

**This is the third of several articles on Middle East petroleum operations by the Journal's editor, who recently completed a several-month on-the-ground study and inspection of this important oil-producing area. Other articles have appeared in issues of August 18 and September 22. Willson's next article will present a complete description of Anglo-Iranian Oil Co., Ltd.'s refinery at Abadan, after which the series will continue with discussions of operations in Iraq, Saudi Arabia, Bahrein Island, Egypt, Qatar, and other Middle East countries.**

Northeast of Masjid - i - Sulaiman field approximately 150 miles, and directed from these headquarters, are the Naft Khaneh and Naft-i-Shah fields on the Iran-Iraq boundary. These fields are connected to small refineries located at Kermanshah (Iran), and Alwand (Iraq), serving important local markets. These plants also had an important part in fueling the transportation supply lines of the British and American forces from the Persian Gulf to the Caspian Sea area for use by the Russians.

The purpose of this article is to give the reader a summary of field practices which are unique in their application and accomplishments. Approximately doubling the fields' output since the start of the war has been brought about with a minimum of materials and equipment. Some makeshift arrangements have been necessary and many existing facilities are inadequate for permanent operation. The management has a program of correcting these con-

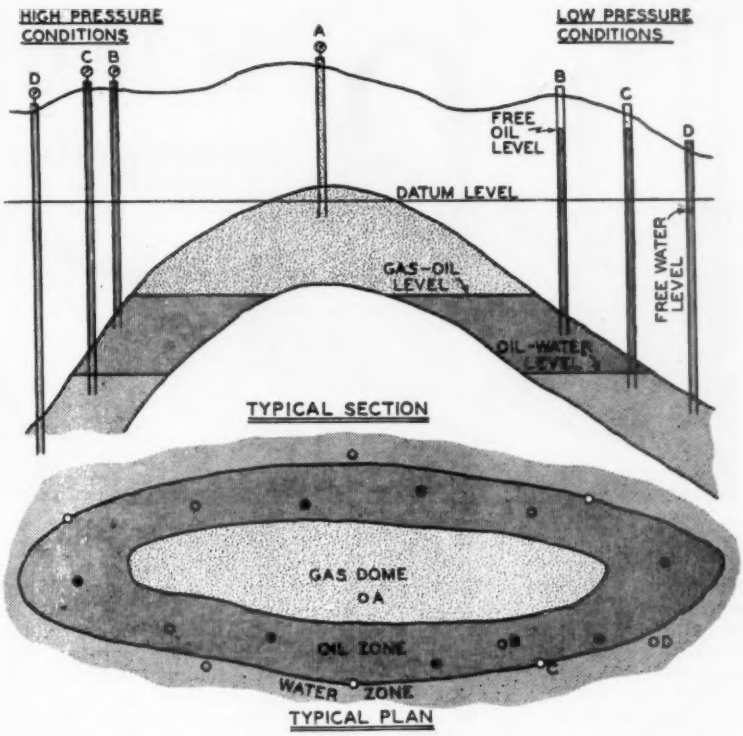
ditions, rounding out the entire field operation to conform with current and expected future production as the required supplies and manpower are available.

### History

William D'Arcy and associates, owners of the original concession, completed the discovery test at a shallow depth in May 1908. This well was a small producer but did establish the presence of crude oil in quantities sufficient to assure further development resulting ultimately in the organization which is now known as Anglo-Iranian Oil Co., Ltd. The discovery well and its cable-tool drilling equipment, brought from Galician fields are maintained here as a permanent museum tribute to the pioneer efforts of the early oil explorers.

By 1911 the development was under way on a systematic basis. The early exploitation was on the "American" plan of close and regular spacing and it was not until additional geological information on the formation was available that the present wide-spacing plan was adopted for the first field and later for all fields.

Not far from the main office building is another well location which will be preserved and pointed out to visitors as long as there is oil in this part of the world. It is the F-7 which was completed November 7, 1911, with an initial production of 1,000 bbl. daily (35,000 Imperial gallons). In March 1914 the production jumped to about 7,000 bbl. daily. When the well was




***Diagrammatic and simplified representation of a South Iranian oil structure***

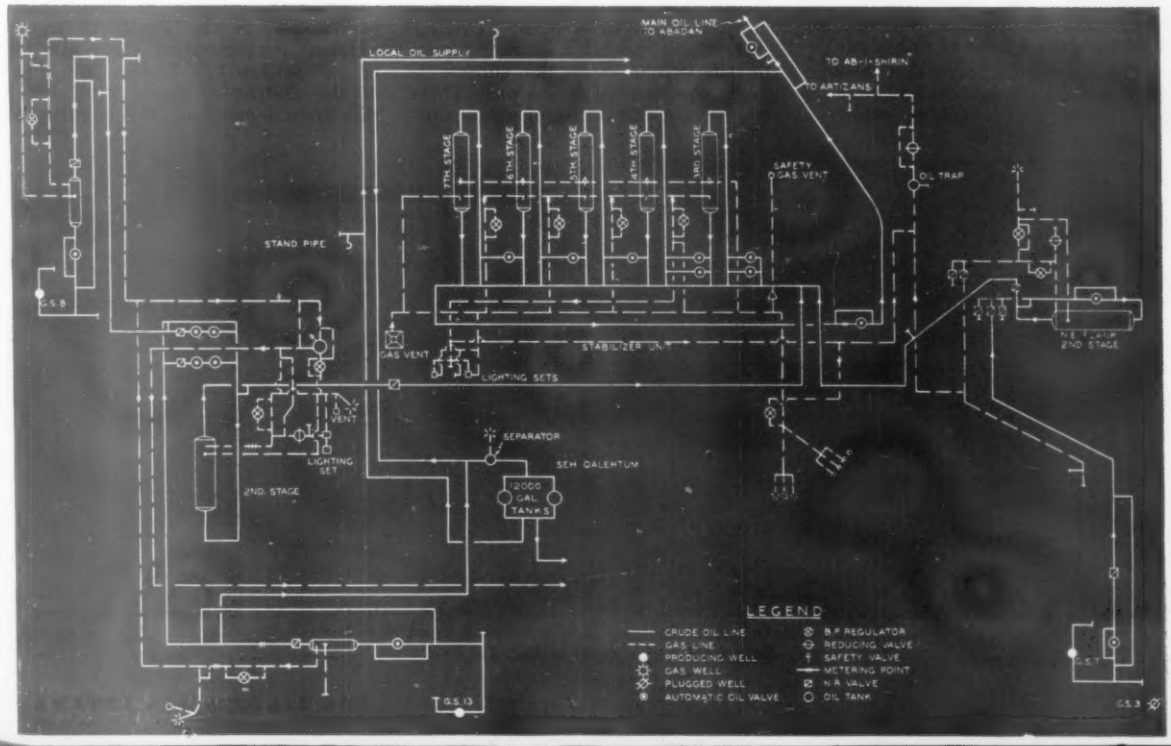
**A. Gas observation well, pressure of which is measured by a dead-weight gage**

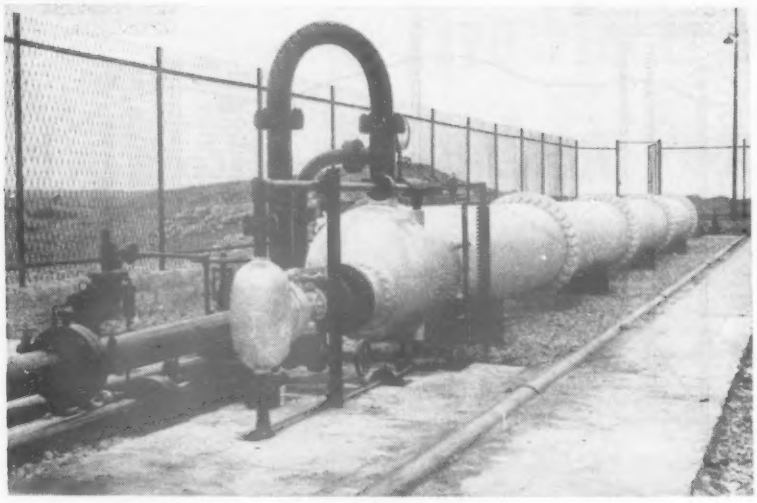
**B. Oil observation well, bottom-hole pressure of which is measured originally but thereafter changes are deduced by measurement of (1) pressure at surface in a high-pressure reservoir or (2) the free oil level, i.e. the level at which oil column stands, in a low-pressure reservoir**

**C. Oil-water level observation well drilled from oil to water; oil-water level is measured by obtaining a "pickup" with a float run on a piano wire (through a gland on the wellhead if necessary)**

**D. Edge-water observation well drilled into edge water, pressure of which is measured originally but thereafter changes are deduced by measurement of (1) pressure at surface in a high-pressure reservoir or (2) the free water level in a low-pressure reservoir**

***Diagram of Gach Saran production system, illustrating general layout of production, stabilization, and control operation***





*A wellhead gas separator in Iran*

mudded off in April 1926 it had produced 6,700,000 tons (more than 50,000,000 bbl.) the world's largest producer. More recently two wells in the Haft Kel field have exceeded this production each with accumulative production in excess of 7.000,000 long tons.

### Geology

The producing formation of the southwest Iranian area is the Asmari limestone of Lower Miocene and Upper Oligocene age. The limestone has a thickness of approximately 1,000 ft. in the fields under development. In the case of Masjid-i-Sulaiman, which is the discovery field, the first 500 ft. consist of thick-bedded greyish foraminiferal limestones. The lower section has many intercalations of marl and anhydrite with a base of anhydrite.

The producing formation is overlain with a series of Lower Fars, an impervious formation which is important in drilling practice and in the production of the fields. For the most part the Asmari limestone is dense and of low porosity. As a result of the folding condition which has been explained in the geological literature of the area the limestone is broken and the production comes from the fissures.

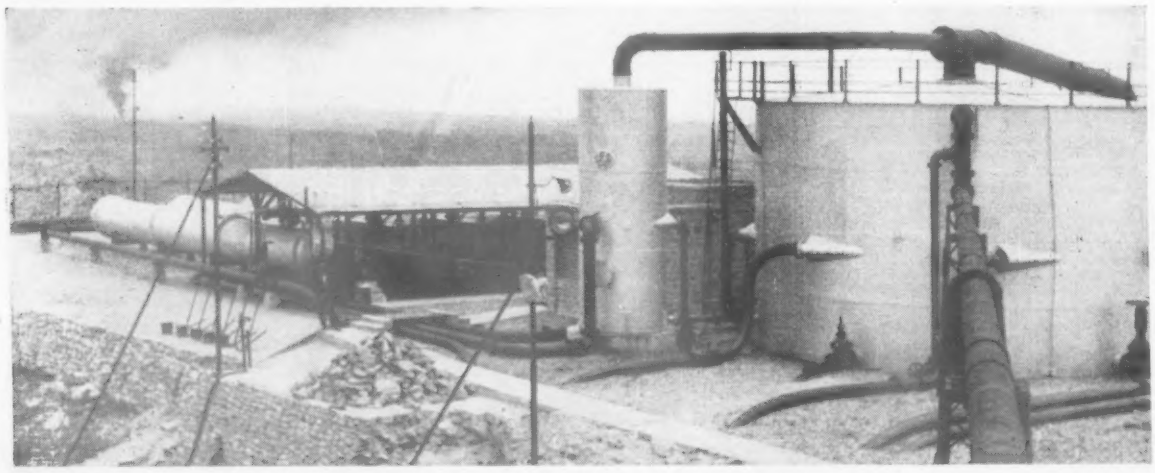
Test wells have shown that where the fissures do not exist commercial production has not been obtained under present production practices. The fact that these fissures are connected over distances of several miles permits the controlled production practices which will be explained later.

In writing about the production formation, Dr. G. M. Lees, chief geologist of the company, explained in Science of Petroleum: "The nature of the porosity of the Asmira limestone has been the subject of much controversy in the past. There is a certain admixture of magnesium carbonate in varying proportions throughout, but careful analyses have failed to show that the porosity is governed by this factor. The limestone as a whole has a ramifying system of mineralized cracks, some filled with calcite, others with anhydrite, more rarely with celestite. These veins are mostly tightly filled, but some have open vugs or enlarge into open cavities. The system of cracks which affords the present channels for fluid movement within the reservoir belongs to a later phase, and many of the mineral veins are traversed by such cracks. These cracks are mostly inclined at steep angles, and many show slickensided faces, although the amount of movement is usually small. Drilling results have proved some small faults, but they are relatively unimportant."

Typical of the structural conditions of the entire area the producing formation of the Masjid-i-Sulaiman field outcrops along the Asmari Mountain which is only a few miles from producing wells. Oil and gas seepages occur at the base of the mountain. These seepages which are found at many points throughout the area were responsible for the early interest among oil explorers.

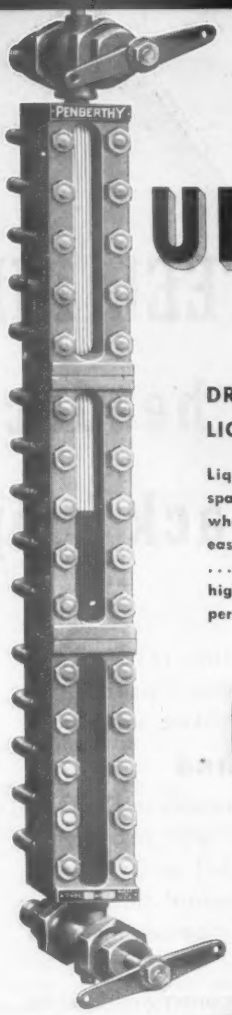
While the structural conditions are readily apparent and in some cases can be pointed out from an airplane, the actual coordination of surface indications and the producing formations has presented many difficulties and a few dry holes. Regarding this condition, Dr. Lees wrote:

"The disharmony between surface formations and the rigid limestone mass, which includes the Asmari and the underlying limestones and marlstones, is the result of independent movement of great masses of salt within the Lower Fars and of the gliding of upper groups on this mobile member. The conditions



*Main stabilization plant in Haft Kel field*

# QUALITY UNCOMPROMISED

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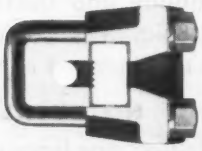

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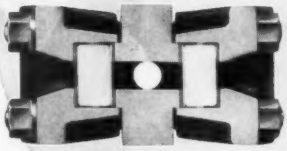
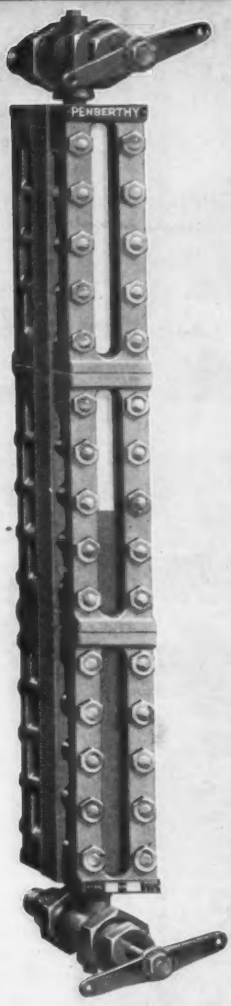
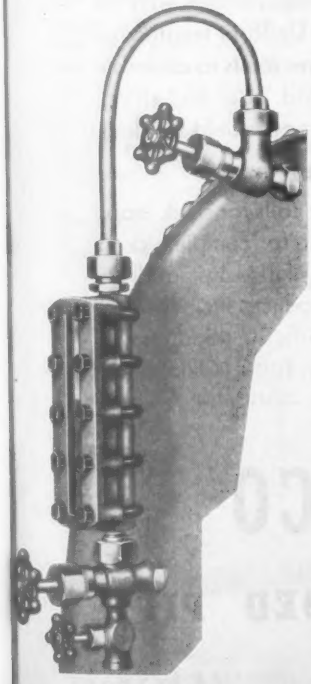





## *Penberthy Liquid Level Gages*



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Water shows black—steam shows white. U-bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler.

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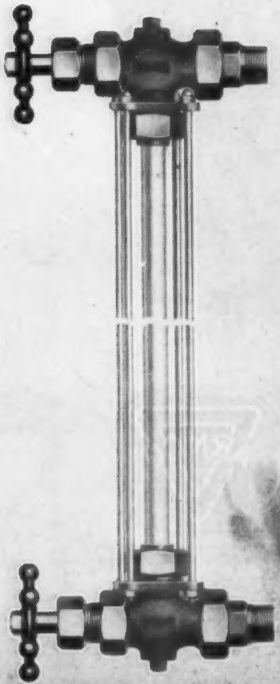

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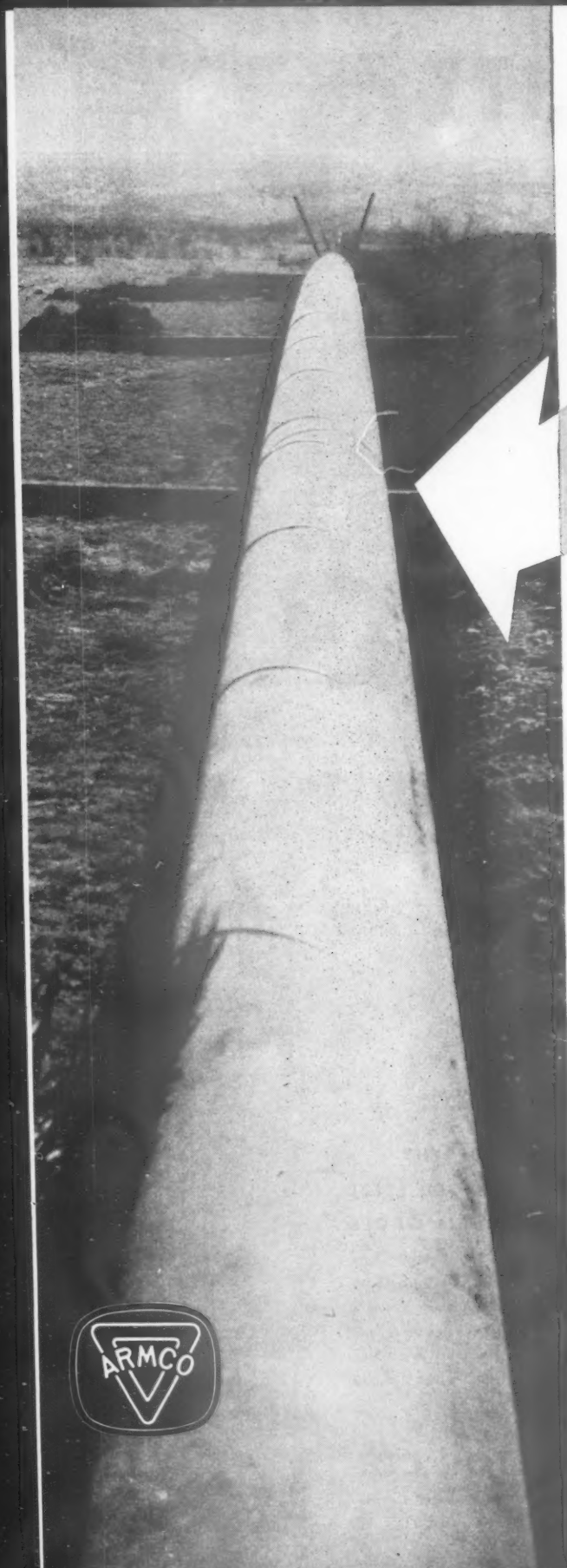

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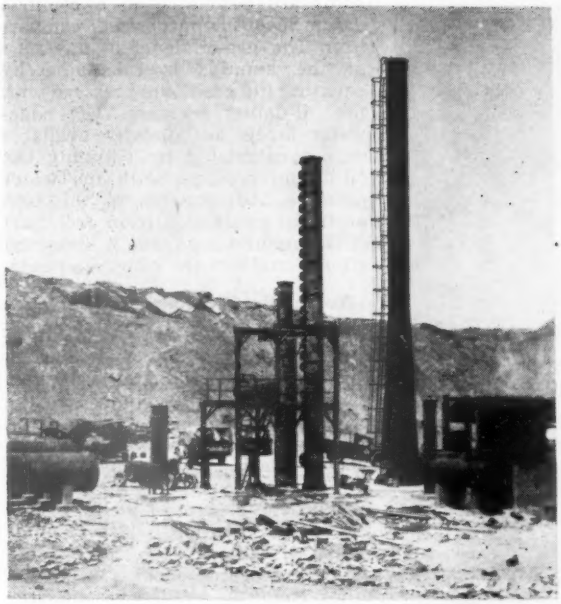
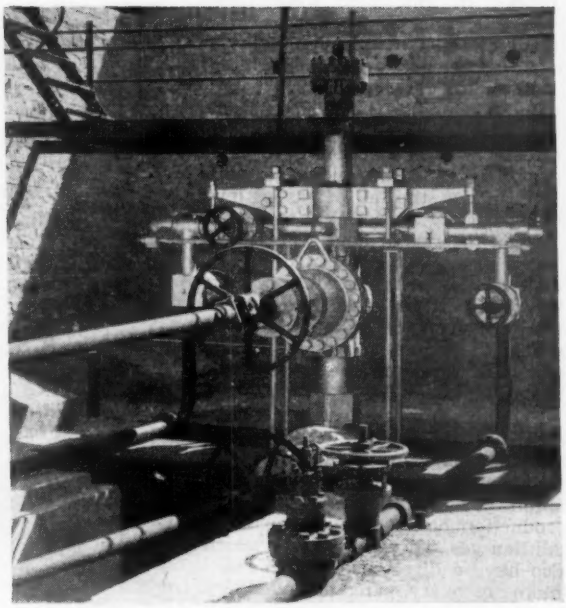


*Topping plant under construction in Agha Jari field*



*Flow head of a high-pressure well in Haft Kel field*

are further complicated by the fact that there were originally great differences in thickness and particularly in the amount of salt deposited on anticlinal areas and in synclinal regions, the result of gentle warping during the early part of the Lower Fars times."

### Organization

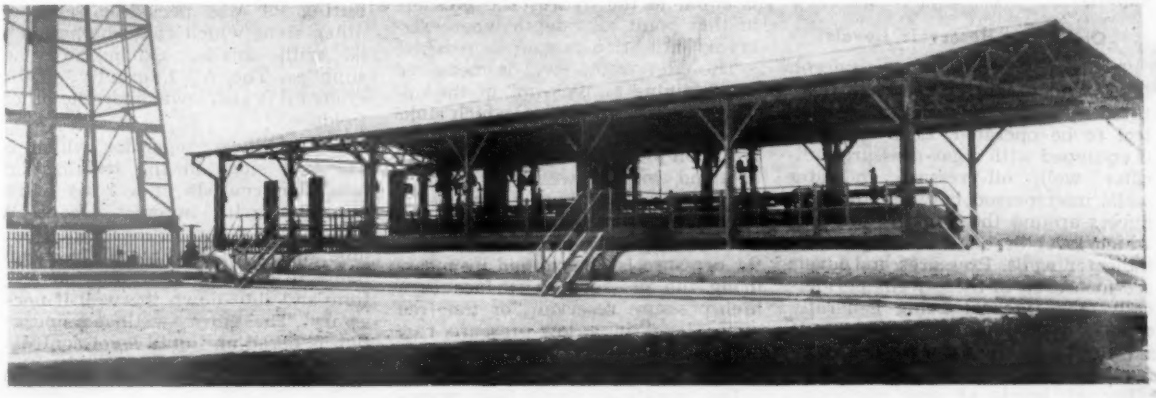
Over a period of 30 years of continuous exploration and development the company's field management here and in the general headquarters at London have perfected many operating practices. As part of the field organization here separate units are maintained to carry on exploration, drilling, and production activities. A complete geological laboratory and field division operates in close cooperation with the drilling and production departments and at the same time carries on new exploration activities. In its exploration program the company has utilized practically every geological tool of the petroleum industry. Plans have been approved for extension of these exploration activities throughout the concession.

This article will be confined to descriptions of three field practices which have had a vital part in the remarkable accomplishments of the company during the emergency and which are representative of the general plan of permanent operation. As a background to these descriptions it is necessary to keep in mind that in this completely unitized operation, market requirements, through the Abadan refinery, determine from month to month the production levels of the field and also the grade of crude oil to be delivered. Some of the crude oil is tendered to the line at 10 lb. gage pressure and part under atmospheric conditions. In other situations part of the crude oil is topped and either the light or heavy ends delivered to the pipe line with the remaining fractions returned to the production formations. During the war the exact method of operation was in effect determined by the joint British-United States military boards operating in some respects through the Petroleum Administration for War of the United States.

The Fields production plant and control is arranged in such a way that within broad limits the refinery requirements, so far as the type of crude to be handled is concerned, can be adjusted to suit. All crude and products dispatched to the refinery is water free.

### System of Reservoir Control

The field operation, after drilling is completed, starts with reservoir control in production with results which are indicative of the possi-



*Main stabilization plant in Gach Saran field*

bilities in unit field development where the necessary practices can be made effective.

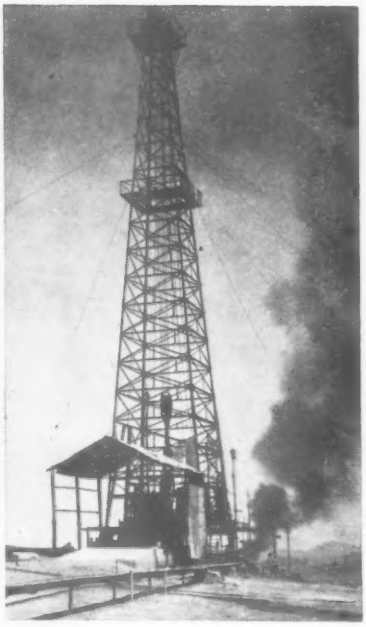
As previously explained, South Iranian oil reservoirs consist typically of intensely folded, massive but well-fractured limestones. The effect of oil production is to cause gas-oil level to fall and edge water level to rise, the fall of gas-oil level being usually appreciably more rapid than the rise of edge water level. These reservoirs, early in their productive life, or immediately in cases where the original gas dome is large, take the form of an annulus with gas in the center and above the oil and with water on the outside and below it.

The principle governing development practice as outlined in accompanying diagram produces an entirely water-free crude with a minimum gas-oil ratio, and with gas production being limited strictly to solution gas. These objectives which also have a direct bearing on maximum recovery, are achieved by maintaining as nearly as possible a horizontal gas-oil level and edge-water level throughout the reservoir. To accomplish this end a strict measure of reservoir control has been adopted in the older fields.

Limitation of total production rate from the reservoir is necessary as the maintenance of a horizontal gas-oil level does not always result in a horizontal oil-water level, ingress of edge water from down the flanks of the structure and from its pitching ends not always being uniform because of differences of permeability, fissuring, and other conditions. The lower the rate of production the lower is the pressure gradient, and hence also the difference of oil-water level, required to disperse the incoming edge water around the annulus. The proportion of production drawn from any part of the annulus is governed by the position of gas-oil level in relation to its position in other parts, wells being throttled in and opened up elsewhere if the gas-oil level is falling too rapidly, causing edge-water level to rise too rapidly.

### Observing Reservoir Levels

A system of "observing" reservoir levels and pressures has been instituted to enable this method of control to be operated. Each reservoir is equipped with a gas-pressure indicator well, oil-pressure indicator wells interspersed between the producers around the annulus, and oil-water level or edge-water pressure indicator wells. Pressures and levels are measured in these wells periodically, the interval being generally once or twice monthly but depending primarily upon the rate of production and upon the general stability of levels at any particular time.



*Drilling well in Haft Kel field*

The gas-dome pressure is measured by dead weight gage connected directly to the well; one well only is required for each dome as the pressure is the same over its entire area. The oil pressure is measured originally by determining the bottom-hole pressure with an indicator of the closed-manometer type but thereafter changes are observed by measuring the pressure at surface with a dead weight gage in a high-pressure reservoir, or the free oil level; i.e., the level the oil rises in the casing, by dipping with a float, in a low-pressure reservoir where the pressure is insufficient to bring the oil to surface. It is essential properly to condition the oil column in these oil-indicator wells before measurements are made, a properly conditioned column being one consisting entirely of oil in which the saturation pressure at the temperature of the column at any depth is equal to the hydrostatic pressure at that point to a depth where reservoir saturation pressure is reached.

The edge-water level is measured by obtaining a "pick-up" of the oil-water level with a float, which sinks in oil but not in water and which is run on piano wire passing through a gland in the wellhead fittings. This method has been found to be more accurate and less tedious than bracketing with a sampler. The water pressure is determined by measuring the pressure at surface in a high-pressure reservoir, or the free water level in a low-pressure reservoir, in the same way as oil pressures are determined.

The results of these field measurements are analyzed. The oil pressures are correlated to a common datum level for purposes of comparison. The gas-oil level in any part of the annulus is calculated by equating the gas-dome pressure with the oil-datum pressure. The edge-water levels are directly available or are calculated by equating the oil-datum pressure with the water pressure. Adjustments to the proportional production from each part of the annulus are made if necessary after a study of the completed data.

### Automatic Controlled Production

With the exception of Masjid-i-Sulaiman all of the active fields in this area incorporate the multistage principle of stabilization for the crude oil. This operation has been steadily improved with the installation at Gach Saran being the last word in this type of equipment tied in with the control of wells so that the entire operation is largely automatic. In the main control room which is located from 1½ to 3½ miles from the wells one operator through a system of electrical controls keeps a constant check on the operation of the wells and the stabilizing operation and through a turn of a control wheel determines the rate of production. The flow tanks are located at an elevation of 3,100 ft. and the oil flows by gravity through one 12-in. line a distance of 166 miles to the refinery.

The company utilizes gravity flow in its operations wherever possible. The gas pressure is available for locating the stabilizing equipment and the flow tanks at the highest possible levels in the fields. This method of operation provides savings in fuel, equipment, maintenance, and manpower.

At present, the Gach Saran field is producing about 40,000 bbl. daily from three active wells. While the structure is only partly outlined it is believed to be the largest so far discovered in Iran. Provision has been made for a large-scale development of the field with some of the facilities already installed. Expansion of the field has been delayed during the war period in favor of other areas which could be expanded with smaller expenditures in supplies. The A.P.I. gravity of the crude oil is also lower than the other fields.

The wellhead separator which is the first stage in the stabilization operation consists of a 3 by 74-ft. separator with automatic controls and electrical connections which enable the operator at the control house to check the operation at any time and shut down the well if necessary. The entire wellhead operation is based on liquid-level controls which permit an increase in the flow from the well as the liquid

*(Continued on page 121)*

ONE HUNDRED TWENTY-SIX UOP UNITS were designed, constructed and placed in operation for production of war-time fuels.

| | | | |
|---|---|---|---|
| Codimer | 56 | Isomerization | 13 |
| HF Alkylation | 28 | Cumene | 11 |
| Catalytic Cracking | 13 | Dehydrogenation | 5 |

The technique and know-how developed during the war in the research, design, and operation of these units together with that accumulated for many years before the war are now available for the post-war period.

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UOP

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# INTERNATIONAL

## Shell Oil Activity Spreads in Colombia

Activities in Colombia are carried on by the Shell Oil Co., in three geographic regions, through five subsidiary companies. Drilling operations are under way in the Middle Magdalena Valley, the Lower Magdalena Valley, and the Llanos, or plains area on the eastern side of the Andes Mountains.

A daily average production of 9,000 bbl. per day from 29 producing wells has been built up in the Casabe field, Middle Magdalena Valley, operated by Compania de Petroleo "El Condor." This field is just across the Magdalena River from the Tropical Oil Co. De Mares Concession.

The crude is about 21.5° gravity, and is found at depths ranging from 3,700 to 3,900 ft. There are now two wells drilling, but by the end of 1945, the program calls for 40 wells producing 12,000 bbl. per day. Reservoir pressure is relatively low and pumping equipment is being installed on some wells. The present spacing program is on a 40-acre basis, but in view of the comparatively shallow depth, it is considered possible that the future development program may ultimately go as low as 10-acre units.

Deeper sand possibilities were indicated by No. 9 well drilled to 6,089 ft., which on preliminary test, made sizable quantities of 24° gravity crude from a pay labeled zone "C," considered comparable to one of the prolific zones producing at De Mares, about 25 miles northeast.

The oil from Casabe is pumped through Condor's own 10-in. line to the Andian National Pipe Line Co. terminal at Barranca Bermeja, just across the river, from which point it is shipped to Andian's Mamonal terminal at Cartagena. The first shipment was made on June 6, 1945, when the field was officially placed on production.

With the exception of a few high points, the entire Casabe field has a lower elevation than the river itself, and is very swampy, making road building a major problem. An extensive dike is being built along the river to protect the property from overflow. Despite the expense resulting from its proximity to the river, there are compensating advantages. All supplies and equipment move in by river, at considerably less transportation cost than would be the case if overland transportation were required. This will become even more important in the future, since development programs call for large quantities of road building and drilling equipment. The camp at Casabe is of modern brick homes and dormitories, and was literally carved out of the jungle.

In the Lower Magdalena Valley, only about 100 miles from the coastal port of Barranquilla, a Shell subsidiary, Cia. de Petroleo "La Estrella," has established a potential production of 2,750 bbl. per day of 42-46° gravity oil from five producing wells on its El Dificil Concession.

The first well tested 54 bbl. of 46° gravity oil, and 700,000 cu. ft. of gas from a total depth of 5,950 ft. Five more wells have been drilled, four of which are producers; while two wells are now drilling. The sixth well was completed in August, good for 1,200 bbl. of 42° gravity oil through a ⅜-in. choke, tubing pressure 1,400 psi., casing pressure 2,500 psi. All wells are producing from a limestone pay in the Upper Oligocene, at an average depth of 5,800 ft. Just north of El Dificil, another Shell subsidiary, Compania de Petroleo "La Perla" is drilling a third deep test on its San Angel Concession.

Informed geologists in Colombia point to the fact that in almost every respect the Lower Magdalena Valley in Colombia corresponds to the Maracaibo basin to the east in Venezuela, which is one of the world's most productive basins. El Dificil establishes the petroliferous character of certain horizons in Colombia's Lower Magdalena Valley basin, and opens up a very important area for active exploration.

Despite its apparently favorable location, access to El Dificil has not been easy. Euipment must be hauled 180 miles by river from Barranquilla to El Banco, and thence by road for an additional 90 miles.

One of the most intriguing areas in Colombia is the low area east of the Andes, known as the Llanos region. In October 1944, Compania de Petroleo Shell de Colombia completed its first test in this region. This well, 1 San Martin, was drilled on the San Martin Concession to a depth of 3,120 ft., where it was abandoned because of mechanical trouble. San Martin 2 is now being drilled a short distance from the first well, and last official reports were that it was held up at 5,800 ft. by a broken line shaft. Since then, persistent unconfirmed rumors are to the effect that an important oil discovery has been made.

An oil discovery in the Llanos would open up one of the greatest geological provinces in South America. Hence every test is watched closely, and if the rumors about Compania de Petroleo Shell de Colombia 2 San Martin should prove true, there will be a great change in Colombia's future oil prospects.

Also in the Llanos region, another Shell subsidiary, Compania Anglo-Colombiana de Petroleo, started operations in March 1945 on its Chafurray Concession. This test, 1 Chafurray, was abandoned in June 1945 at 1,750 ft. Chafurray 2 is now drilling and latest reports are that it is coring at 1,770 ft. Both wells are approximately 100 miles from the Andes foothills.

Transportation of materials into this region constitutes a major problem, even by South American standards. Materials are moved up the Magdalena River to the port of Salgar, thence by rail to Bogota, where they are transferred to trucks for movement along a tortuous mountain highway, crossing the cordilleras at 12,000 ft., and then dropping down to the Llanos at about 1,500 ft.

## Official Ceremonies Mark Two Wildcat Starts

With official ceremonies, marked by the presence of high government officials, two important wildcats have been started in Colombia.

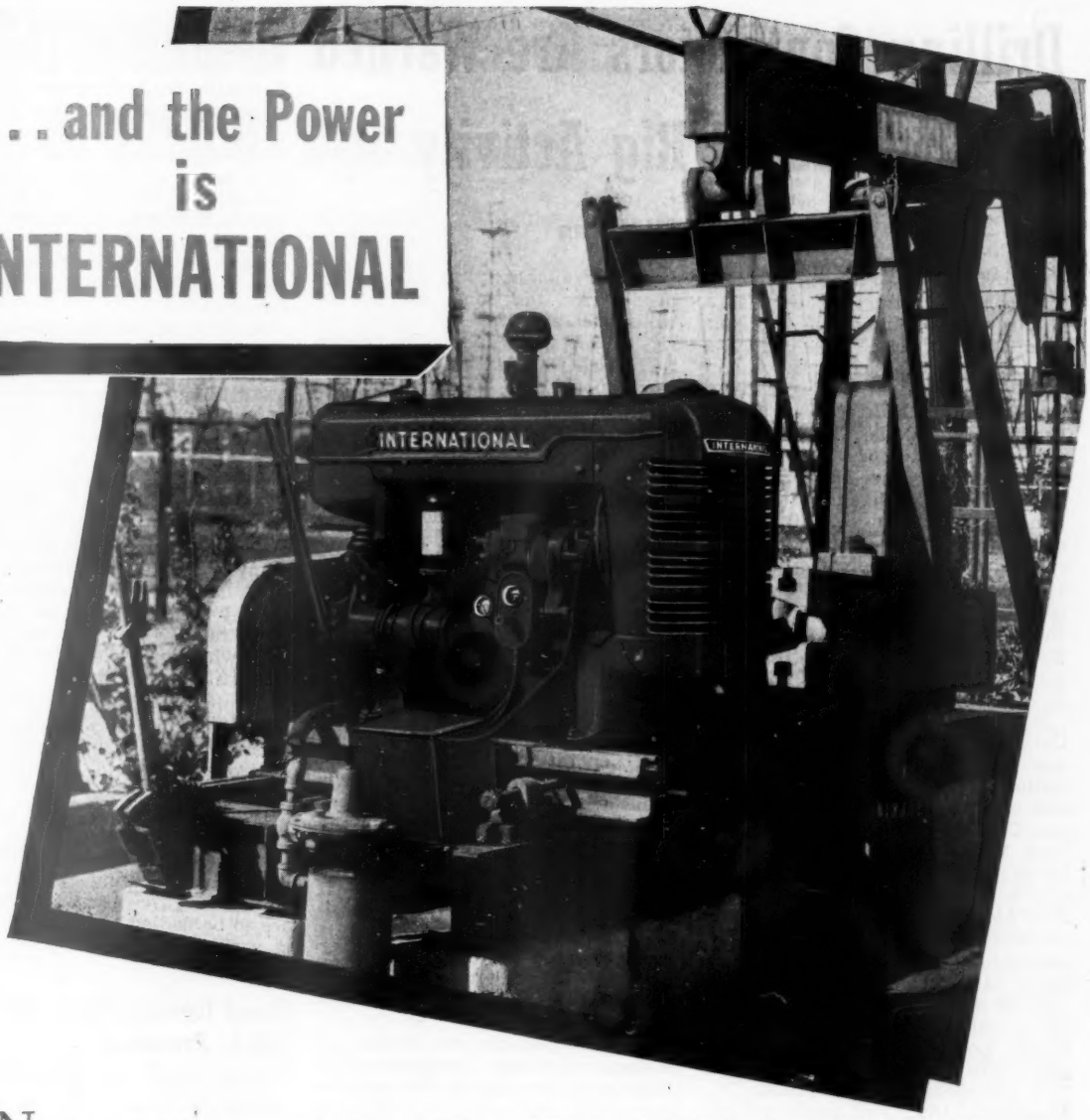
Richmond Petroleum Co. spudded its 12,000-ft. test on the Caraballo tract, only 55 miles from tidewater, in the presence of the Colombian ministers of oil and of labor, the governors of Atlantico and Magdalena provinces, the bishop of Santa Marta, senators and congressmen, and members of the oil committees.

Petroleos Ariguani S. A., a new company, owned 50 per cent by Colombian nationals and 50 per cent by Tropical Oil Co., spudded its 10,000-ft. test later in the week, in the presence of another distinguished gathering.

## Nova Scotia Wildcat Drilling Below 6,000 Ft.

Sun Oil Co. is drilling below 6,000 ft., in its wildcat in Nova Scotia, a few miles south of Amherst, Cumberland County. Sun has several hundred thousand acres under lease in this general area. This test is about 50 miles southwest and across the Northumberland Strait from the joint test of Socony-Vacuum and Cities Service Oil Co. in Hillsborough Bay, Prince Edward Island. The latter test was reported drilling below 13,209 ft.

# . . . and the Power is INTERNATIONAL

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## INTERNATIONAL Industrial Power

# Drilling Contractors Are Warned Of Reduced Rig Activity

**by Neil Williams**

OKLAHOMA CITY. — Warnings that the drilling industry as a result of the ending of the war might expect in the near future a period of reduced rig activity and highly competitive times were given by Howard P. Holmes, Two States Drilling Co., Dallas, in his presidential address before the American Association of Oilwell Drilling Contractors at its fifth annual convention here October 1-2. This will bring many new serious and difficult problems to overcome, he said, as he urged members to greater cooperation and effort in carrying out and expanding the association's program and plans initiated the past year for betterment of the industry's operating conditions.

William T. Payne, president, Big Chief Drilling Co., Oklahoma City, was elected president of the association to succeed Holmes. Other new officers elected were: J. E. Warren, Carl B. King Drilling Co., Midland, Tex., vice president at large; George P. Livermore, Lubbock, Tex., vice president for West Texas and New Mexico; C. W. Alcorn, Falcon-Seaboard Drilling Co., Houston, vice president, Gulf Coast; H. C. Milhoan, Milhoan Drilling Co., Tulsa, vice president for Central Mid-Continent and Rocky Mountains; A. S. Hayes, Loffland Brothers, Los Angeles, vice president for California; F. L. Carmichael, Delta Drilling Co., Evansville, Ind., vice president for Illinois, Michigan, Indiana, and Kentucky; James D. Leonard, Leonard Drilling Co., Mount Pleasant, Mich., vice president for cable tools; J. K. Butler, oil production maintenance, Houston, vice president for well servicing, and Harry W. Bass, Harry Bass Drilling Co., Dallas, treasurer. Brad Mills was reelected executive secretary.

Holmes based his warnings partly on predicted reductions of domestic crude-oil production of about 1,000,000 bbl. daily from peak wartime output. With reduced withdrawal rates, he pointed out, there is less money on hand from sale of oil and gas to spend on drilling of wells.

One of the chief problems arising from reduced drilling lies in the retirement from active operation of a considerable number of rigs. With the return to maximum efficiency in drilling as experienced oil-field crews come back and better equipment and materials to maintain rigs become available, fewer rigs will be needed for the same number of wells. He estimated the number of rigs which will have to be retired will reach 600, reducing active rigs from about 1,800 to about 1,200.

He announced the instigation of a program whereby an independent research would be run upon all parts of the drilling string, including the kelly, drill pipe, tool joints, drill collars, and subs, and dealing with all factors which affect life and cost of these items. The research will be made by Battelle Memorial Institute of Columbus. He reported progress in the association's new safety program and other lines of organized effort.

Glenn A. Campbell, Glenn Drilling Co., Tulsa, in discussing "adaptation of contract drilling to peacetime operations," expressed the opinion that the number of wells to be drilled in 1946 should be at least 30,000, the equivalent of the number planned for this year.

"In the interest of building up productive capacity," he said, "it should be the patriotic duty, even in peacetime, of operators of this nation, in the light of present daily demands, to drill the number of wells, and possibly an additional 2,000 to 5,000 wells."

Whether operators are willing to go ahead with such a program while crude price remains at its present level is decidedly subject to speculation, he said. What influence foreign operations will have on the domestic crude demand also is a significant, but unknown factor, he admitted. He suggested an adjustment of contract prices is in order as a means of influencing the number of wells to be drilled, and pointed out that with the return to normal operating efficiency and reduced cost it might be possible to pass some of the savings on to the operators.

*William T. Payne, newly elected president of A.A.O.D.C.*

Fred M. Mayer, Continental Supply Co., Dallas, discussed prospective developments and refinements in drilling equipment and equipment-delivery prospect. He said he did not look forward to any revolutionary changes in present drilling methods or equipment. Any changes will be evolutionary, as in the past, and not upsetting to the industry, he said. There will, however, be many gradual improvements. Equipment-delivery prospects look decidedly better as a whole with many items rapidly becoming freely available while in some lines the situation still is indefinite.

Resolutions placing the association on record as opposing federal encroachment during peacetime in control of oil and gas production were passed.

Douglas Ragland, chief engineer, Humble Oil & Refining Co., stated that many fundamental improvements in drilling practice and equipment are necessary if wells are to be drilled to increased depths at a profit.

## Hotel Reservations for A.P.I. Prorated

NEW YORK.—So heavy are hotel reservation requests for the twenty-fifth annual meeting of the American Petroleum Institute at Hotel Stevens, Chicago, November 12-15, that an A.P.I. housing committee has been named to process applications for rooms.

The committee comprises L. S. Wescoat, Pure Oil Co., chairman; Sheldon Clark, Sinclair Prairie Oil Co.; B. L. Majewski, Deep Rock Oil Corp.; A. W. Peake, Standard Oil Co. of Indiana. The committee is working through the Chicago Convention Bureau, 33 North La Salle Street, Chicago.

Many of the hotels are already sold out for the A.P.I. meeting dates, and all future requests for rooms will be prorated, the Institute announced. Reservations received by any hotel in excess of its accommodations will be referred to the convention bureau for allocation by the A.P.I. housing committee. The committee also will review all reservation applications.

# Reconversion To Be Center Of I.P.A.A. Discussions

RECONVERSION problems will be the central theme of discussions at the first postwar membership meeting of Independent Petroleum Association of America, to be held in Tulsa October 14-17. These discussions will have the dual purpose of guaranteeing a domestic oil industry capable of meeting every requirement of peacetime industry and the consuming public, and to provide for a healthy domestic industry as essential to the nation's future economy. Methods of protecting independent producers against threatened imports of foreign crudes, will be considered.

The independents long have stood for limitation of imports as a means of protecting domestic producers against cheap foreign oil and the low wage scales prevailing in foreign fields. Also, the association has held that this country should find and develop its oil resources rather than import and become dependent upon foreign oil.

Directors and state vice presidents will be elected to form a new directorate, and the directors will elect a president to succeed Ralph T. Zook of Bradford, Pa., who completes 2 years as head of the association and has announced a wish to retire.

Arrangements for the 4-day meeting are in charge of W. G. Skelly, president of Skelly Oil Co., as general chairman. The program committee with Merle Becker, vice president of W. C. McBride, Inc., St. Louis, as chairman, arranged for meeting continuity and speakers. The Tuesday noon luncheon will be presided over by H. B. Fell, executive vice president. President Zook will deliver the annual address followed by a discussion of oil in the nation's capital by Russell B. Brown.

General sessions will begin Monday at 2.30 p. m. and will continue throughout the remainder of the meeting. Papers and reports will cover vital issues. "We Bombed the Nazis Out of Oil" will be a talk by C. S. Snodgrass, associate director of the foreign division of Petroleum Administration for War. "World Oil Supply" will be discussed by William B. Heroy, director of the division of reserves, PAW.

## "Petroleum vs. Plutonium" To Be Goodman's Subject

NEW YORK. — "Petroleum vs. Plutonium" will be discussed by Dr. Clark Goodman, of Massachusetts Institute of Technology, at the twenty-fifth annual meeting of American Petroleum Institute, to be held November 12-15, at the Stevens Hotel, Chicago. Dr. Goodman is one of the group of scientists whose research resulted in development of the atomic bomb.

## Townsend Acting Chief of Petroleum Division

WASHINGTON.—Rex Townsend, geologist and petroleum engineer, has been appointed acting chief of the petroleum division, Department of State, succeeding Charles Darlington, who is retiring from government service. Townsend has been in the State Department since 1943, following a year as petroleum adviser to the Bolivian Government.

## Beaumont Iron Works Sold To American Locomotive

BEAUMONT, Tex.—American Locomotive Co. has acquired Beaumont Iron Works Co., subject to approval of Beaumont's stockholders, and American Locomotive is expected to take over operation of the other organization next month. There will be no interruption of service, as Beaumont's line of production will be continued by the purchaser. In addition, facilities for overhauling heat exchangers are to be installed. Jones & Laughlin Supply Co. will distribute Beaumont drilling and producing equipment as heretofore

A. I. Brainard, president of Beaumont Iron Works Co., said the executives of his organization would be retained and that postwar expansion of the business was looked for.

## Ceiling Price Changed in Four Scattered Fields

WASHINGTON.—Increases in the ceiling prices of four crude oil pools to bring them up to prices for comparable crudes produced in the same areas have been authorized by the Office of Price Administration, effective October 1. In all cases purchasers of the crude will absorb the increase without change in product prices. The increases are:

1. An increase of 94 cents per barrel is allowed in the ceiling price on oil from Cow Run sand, Ohio, because this oil has been officially reclassified as Pennsylvania grade crude. The new ceiling is $2.25 a barrel. Production from this sand is approximately 130 bbl. monthly.

2. Lewisville pool, Arkansas, will have a new ceiling ranging from 86 cents to $1.18 a barrel, depending on gravity of the crude produced. This is an increase of 10 cents a barrel. Approximate daily production at this pool is 125 bbl.

3. Horse Creek field, Wyoming, will have a new ceiling of $1.25 a barrel for crude of 40° gravity and over, with the customary 2-cent differential for each degree of lower gravity crude. This is an increase of 5 cents a barrel. The field produces approximately 10 bbl. daily.

4. Quealy Dome field, Wyoming, will have a new ceiling of $1.25 a barrel for crude of 40° gravity and over, with 2 cents off for each degree of lower gravity. This is an increase of 6 cents a barrel. The field produces 700 bbl. of oil daily

# DEATHS

**E. P. McKinley,** 67, district superintendent of the lease department of The Ohio Fuel Gas Co. for 38 years, died last week in Ashland, Ohio.

**Ernest E. Slingerland,** 72, Gilmore, Pa., pioneer oil producer in Pennsylvania fields, died September 28. He was born at Pithole, Pa., famed in the annals of early oil-boom towns, where his father was an operator. Slingerland was one of the first to employ flooding as a recovery method in the Bradford area. In addition to his producing interests he entered refining, and he was one of the original stockholders and directors of Bradford Refining Co.

**C. A. Young,** 56, manager of sales in the hot-rolled products division of Sheffield Steel Corp., died September 15 of a heart attack in Lafayette, Ind. His home was in Kansas City. Young was a civil-engineering graduate of Purdue University.

**A. J. Lockett,** 70, independent oil man, died September 22 in Marshall, Tex.

**Ernest Hollis,** 56, independent oil producer and contractor, died of a heart attack September 29 in Tulsa.

**Martin J. Grogan,** 49, owner of Grogan Oil Co. and a veteran of World War 1, died September 24 in Shreveport.

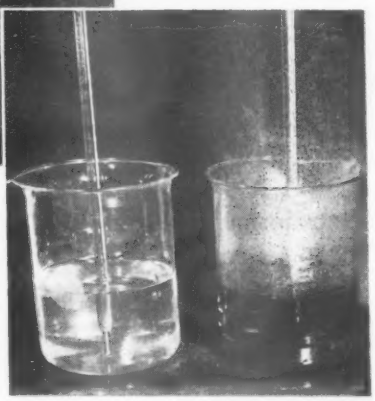


XUM

# The Amazing New Chemical Family—

**by Arch L. Foster**

*Left: Efficient operation of pressure-lubricated valves is accomplished through use of a Dow Corning silicone grease especially designed for pressure-lubricated valves. Below: Demonstration of the exceptional heat stability of DC silicone fluid. Beaker at right contains a high-grade petroleum lubricating oil. That at left contains DC 200 fluid having same viscosity. Both beakers are heated to 200° C., where petroleum oil vaporizes while silicone fluid does not*



**Silicones form a large chemical family which has only recently become important in many industrial and commercial applications. Made from the original raw materials sand, coal, petroleum, and air, they possess specialized chemical structures which make them preferred products for many uses. Silicones are used in special lubricating greases where high temperatures must be withstood for long periods. They form the main component of varnishes which permit much smaller electrical units to be built per horsepower delivered, and enable electric equipment to be operated at much higher temperatures. Molded and thromo-curing plastics are made from these products, the specific properties of which may be varied over wide limits by varying the organic constituents, and the kind and degree of crosslinkages employed.**

A MULTITUDINOUS family of new materials which have the earmarks of an Aladdin's dream has come into the chemical industry with the development in recent years of the heterogeneous products, the silicones. Made up of silicon and oxygen, most common and abundant of all earth's elements to which are attached various organic alkyls, aryls, alkenyls, and other organic radicals, the silicones and their polymers possess some of the most amazing and most useful properties known to man.

Synthesized first some 40 years ago and considered laboratory curiosities, these materials have been adapted in recent years to more and more important commercial and industrial uses, serving purposes not satisfied at all, or very inadequately by other older materials. A Technical Glassware Fellowship was established by Macbeth-Evans Glass Co. at Mellon Institute in 1931 and eventually took up the study of organo-silicon compounds for impregnating insulating materials. This company later merged with Corning Glass Works and continued the synthesis and study of these products, finally combining with Dow Chemical Co. to form Dow-Corning Co. which is one of the two or three most active organizations in research and development of silicone chemistry and technology. During the last 10 years and longer General Electric Co. researchers also have been busy in studying the application of these materials to electrical needs, spurred on by the need for more efficient insulation products for tomorrow's electrical equipment. The Westinghouse Laboratories also have carried on intensive research.

### Applications of Silicones

For use in petroleum products, one of the major applications developed for silicones is in lubricating greases. The products in which silicones are used are made for extremely severe service conditions where heat resistance and very low viscosity-temperature change—high viscosity index—properties are at a premium. A line of such greases has been produced by Dow-Corning for

plug cocks, using liquid silicones. These greases change viscosity very slightly when compared to hydrocarbon oils of similar viscosity at a given temperature, and operate satisfactorily at temperatures ranging from 40° F. to 400° F.

Since the soaps, and other products used to thicken ordinary petroleum greases are only sparingly soluble in the silicone liquids used, they cannot be employed as thickeners in these greases. So far, small amounts of extremely finely divided carbon black have been used to thicken some of these greases, making them black and opaque. They are applied wherever high-temperature conditions are found in the operation of valves. Highly resistant to acids, alkalies, and oxidants they are useful wherever these types of corrosive materials are used. These greases are said to be entirely insoluble in steam and water, can be used in lines hanling hot water, or when such are being cleaned with high-pressure steam without the grease melting out of valves.

Another interesting use of these greases is as a coating for containers such as metal drums, to prevent contained materials from adhering to the inside surface. Similarly, a thin coat of silicone grease prevents or minimizes attack of metal surfaces by oxygen or corrosive fluids, such as maintaining copper surfaces bright by coating thinly with these greases. Dies used for the casting of fluidized plastics, etc., are coated with these greases to insure immediate freeing of the cast article from the inner die surfaces. Either toluene or carbon tetrachloride may be used to clean these greases from surfaces where they adhere.

Silicone "rubber" is especially useful in locations requiring long periods of operation at high temperatures, where sealing efficiency is high, or when shock resistance must be high and long lived. Aircraft-engine superchargers must operate for long hours at high temperatures; gaskets of silicone rubber are used in the superchargers of the huge B-29 bomber engines. Gasketing Navy searchlights, where high stock resistance caused by naval gunfire as well as high heat must be withstood, with silicone rubber has solved a definite and serious problem, it is reported. Not suitable for tires because of low tensile strength, silicone-rubber rolls for printing presses where hot inks are used should prove much superior in life and performance, say technologists of that industry.

### Electric Insulation From Silicone Varnishes

Outstanding is the performance of silicone resins in varnishes and insulation for electrical goods. Testing a 250-kva. electric generator, which normally operates at the standard 266° F. winding temperature, for 3,000 hours at 482° F. (250° C.) the insulation showed excellent condition at the end of the period, causing electrical engineers to estimate a 400-year use life for the insulation at the standard operating temperature. Heavy-duty motors for trolleys, and other uses, operating under severe conditions have shown that the effectiveness of the insulation and thus of the units is multiplied several fold by the use of this insulation material. This result is attained by using Fiberglas insulation with silicone varnishes. Articles may be molded of silicone rubber, the process including filling the mold with the plastic, uncured material, holding under 500 psi. for a few minutes at room temperature, heating to elevated temperatures such as 150° C. (302° F.) for several minutes, cooling to approximately room temperature before releasing the pressure, removing from the mold and curing under conditions ranging from 80° C. (176° F.), for 1 hour, to 150° C. (302° F.) for 24 hours, depending on the silicone used and on the result required. Extrusion and lamination procedures may also be employed to make many commercial and industrial products. Stocks of glass fiber or cloth, organic cloth materials, etc., may be coated with thin films of the polymer and the stuff cured in the material by well-developed methods.

Coating of ceramic materials to render them water repellent and to prevent contamination is carried out successfully by dipping the de-

*Traces of silicone fluid serve as foam inhibitors as demonstrated in the kettle of boiling asphalt at left. (Courtesy Dow Corning Corp.)*

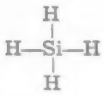
*New silicone rubber, developed by General Electric, looks like putty, and bounces like a rubber ball. It is predicted that it may find a place in such articles as golf balls and baseballs*

greased and thoroughly cleaned ceramic articles, preferably immediately after they come from the kiln, in a solution of an oil-like silicone polymer in a neutral solvent. The same general plan may be followed for coating glass or other surfaces to prevent adhesion of water or other liquids to their surfaces.

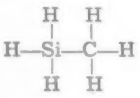
Numberless other uses of these remarkable products have been developed. Filter paper which has been exposed to methylchlorosilane vapors for a second or shorter time is not wet by water, hence might be used to separate mixtures of water with other liquids which will wet the silane-impregnated surfaces. Scientists engaged in studying this new field consider that its possibilities have not been explored to any great degree, to say nothing of the untouched possibilities for commercial and industrial application.

### Nature of Silicones

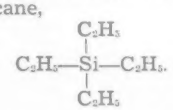
The type ingredient of silicones may be said to be the silicanes, with one or more organic radicals attached directly to a silicon atom, and with hydrogen occupying the valence bonds not held by organic groups. The basic formula again is silicane,



analogous to methane, $CH_4$, and from which the substituted silicanes are derived. One or more of the hydrogen atoms of silicane may be replaced by organic radicals, such as in methyl silicane,

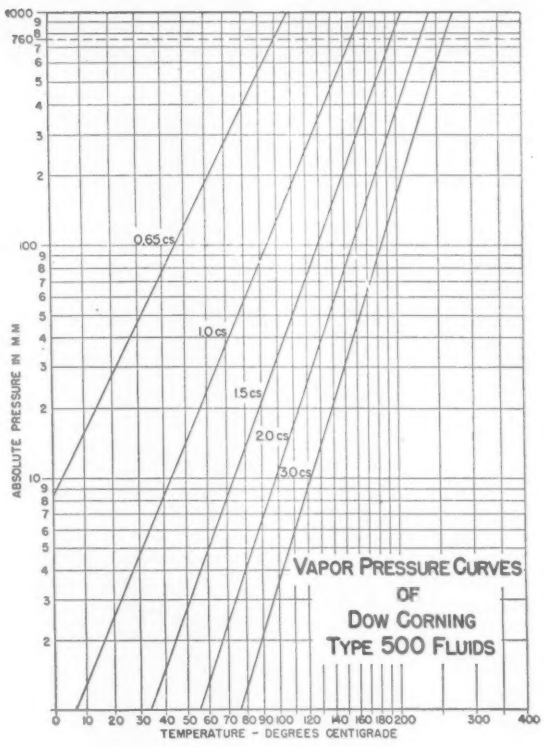


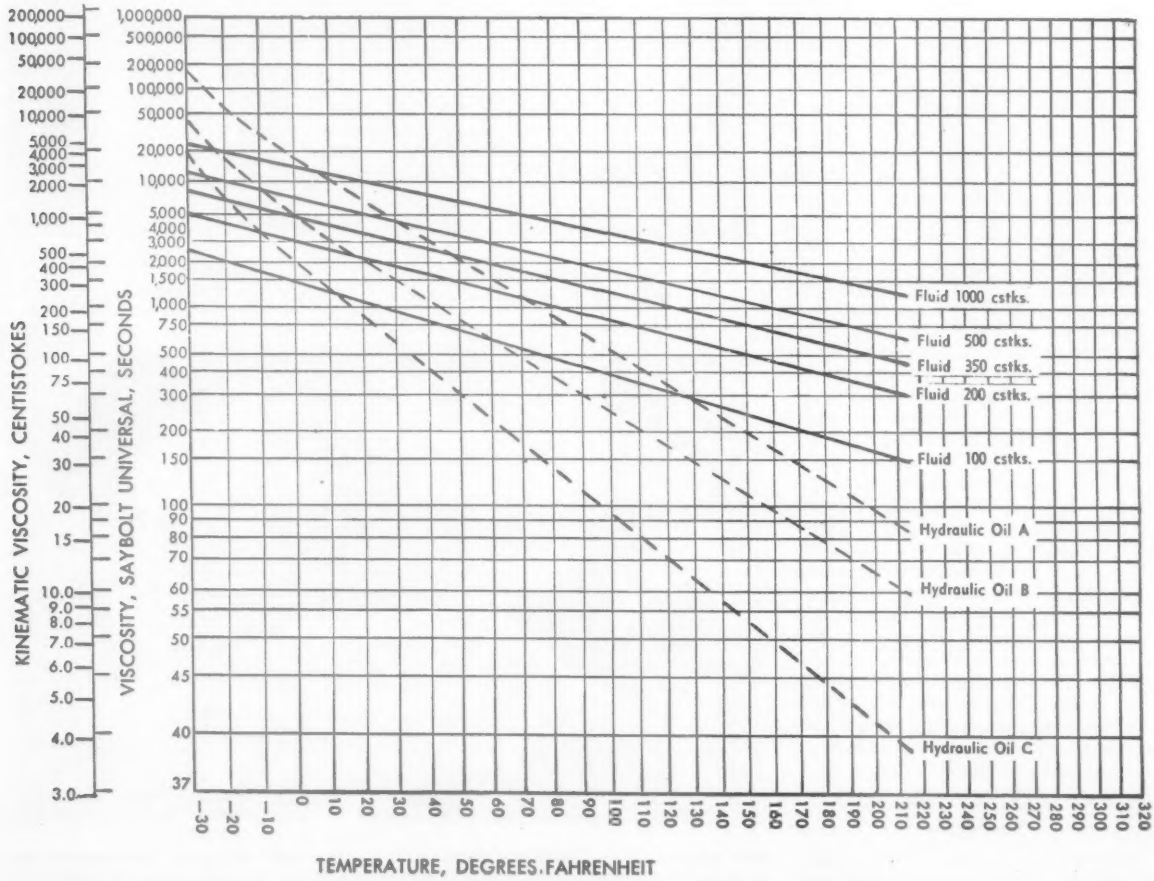
or tetraethyl silicane,



We may conceive of silicones being formed by joining two or more of the residual groups

*(Continued on 112)*




***Viscosity-temperature curves for viscous silicone liquids and for hydraulic oils in which silicones have been used***

# Horizontal Drilling Restores Well Which Had Been Abandoned 17 Years

**by L. P. Stockman**

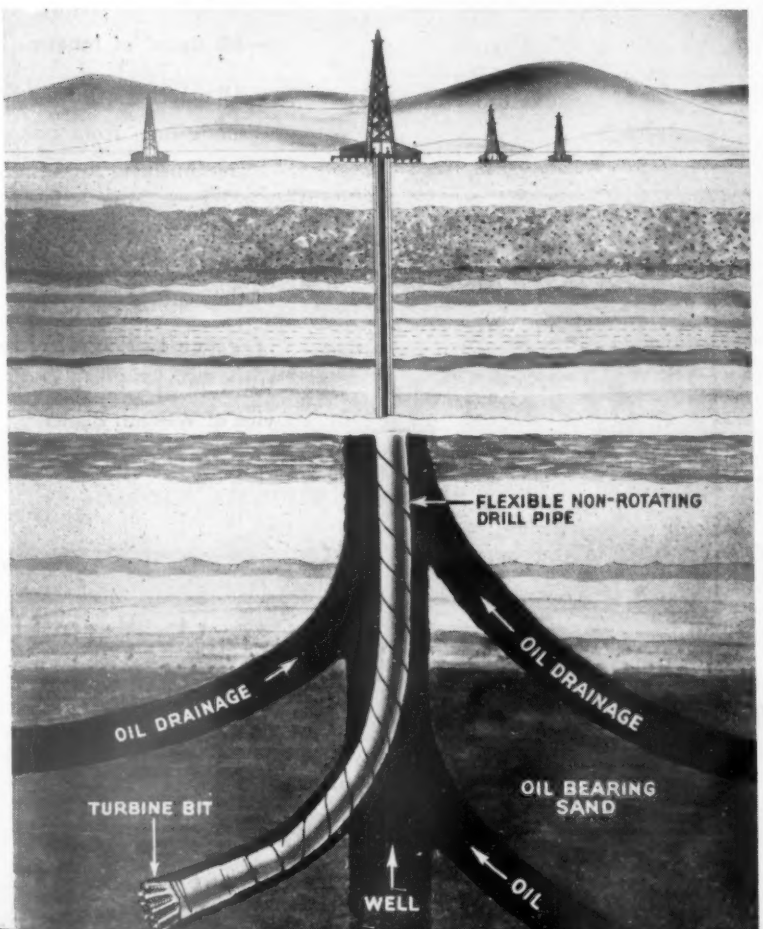
SEVENTEEN years ago a California operator abandoned Well 16 in 27-31s-22e at Midway-Sunset because it had ceased to be commercially productive, yield having declined to 1 bbl. daily. This well was recently recompleted pumping 25 bbl. daily of 13° gravity oil by application of horizontal drilling, a method conceived by John A. Zublin, Los Angeles engineer.

Considerable progress has been made in this method of horizontal drilling since it was exclusively reported in The Oil and Gas Journal of August 12, 1944, pages 58-59. Basically, mud fluid pressure transmits hydraulic force through a series of volutes and vanes within a turbine bit assembly, causing the rotor element to spin at about 4,000 r.p.m. under load. This actuates the cutting bit in the same manner as the cutting action of a standard Zublin bit. A feature of the method is the use of spirally cut pipe which assumes an arced position under heavy spring tension against the wall of the hole. Straight flexible drill pipe and the rate of drilling maintain a practically horizontal position after the bit has entered the wall of the hole.

Eight horizontal drain holes were drilled in this rejuvenated well before it was put back on production. Total horizontal footage was 421 ft. made by six turbine bits. Actually only five bits were used as the first was pulled without making any hole due to pump trouble. In this test, two power pumps were employed,

*Fig. 2—Elements required to horizontally drill oil well consist of straight mandrel to insert in curved flexible drill pipe which directs the hole away from the vertical hole and the turbine bit connected at end of curved flexible pipe actuated by high-pressure drilling mud*

*Fig. 1—Schematic diagram of horizontal holes drilled in recompleting oil well*




one 7¼ by 10 in. and the other 7¼ by 14 in. Bit 2 drilled 75 ft. of horizontal hole from a vertical depth of 929 ft. At 66 ft. the pump was running 58 s.p.m. under a pressure of 450 psi. Bit 3 was oriented into the hole at 918 ft. The mud weighed 67 lb. per cu. ft. and had a viscosity of 25 sec. Line pressure from the pump was 450 psi. After drilling 75 ft. of side hole, two 31-ft. singles were pulled with the pumps operating and then, after shutting down the pumps, the bit was raised to 910 ft. from 918 ft. being oriented on its way up to drill out at N. 75° W. At this point the mud weight was 67.5 lb., with a viscosity of 25 seconds and the line pressure was 410 psi. After drilling 10 ft., it was impossible to go ahead. The bit was pulled and a 10⅝-in. rock bit on conventional drill pipe was run to clean out the vertical hole. Sand

*then they said to themselves*

# Boy!—did we build a business?

Recommended for niches in the Hall of Shame are the leaders of the House of Heil.

—All ideologists of the New Day.

—All fluent of tongue.

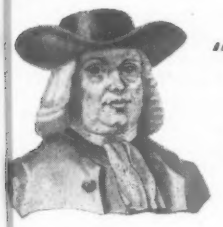
—All uttering words to dissuade men from honorable business tactics.

So their flourishing business came to the end of the road.

—recalling again the truth in the business advice of William Penn:

## "False dealing travels a short road...true worth is inevitably discovered

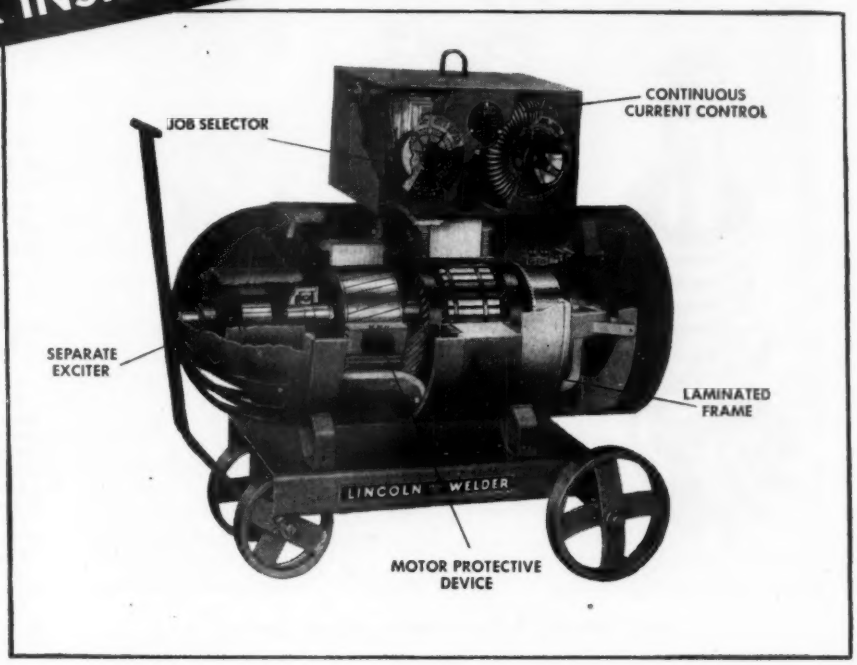
Timely precept, that. Many businesses will discover the true worth of techniques and equipment used in defeating the House of Heil . . . such as . . .



# "True worth is inevitably discovered"...*he says*

***LOOK,*** how to discover the true worth of an arc welding machine:

## LOOK INSIDE...




## Discover how the "SHIELD-ARC" WELDER cuts costs 15% to 20%

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**Dual Continuous Control** ("Job Selector" and Current Control) provides precision adjustment of any TYPE or SIZE of arc to suit the job, for *highest welding speed at all times.*

**Separate Excitation** assures *fastest welding* under any and all conditions . . . at all current values.

**Laminated Magnetic Circuit** for quicker response of welder to arc demands . . . *for faster welding.*

**Self-Protected Motor** assures positive and complete protection against motor burn-outs . . . allowing sustained operation at high amperage for *highest welding speed.*

**31 "Shield-Arc" features** are described in Bul. 412. Free on request.

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# ARC WELDING

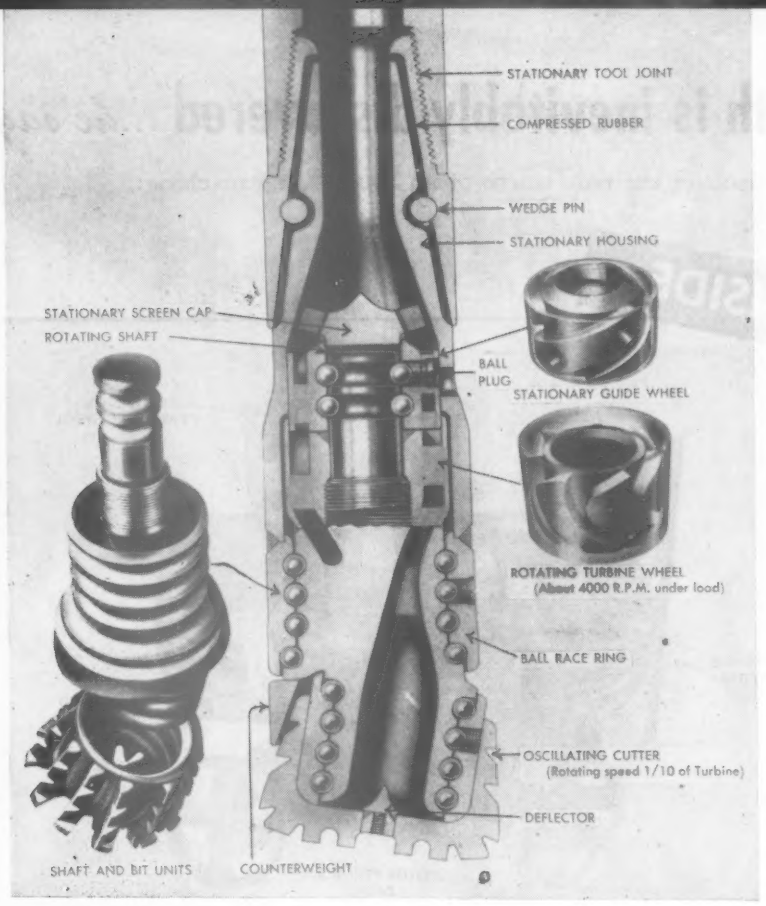



*Fig. 3—Details of Zublin bit used in horizontal drilling*

bridges were found at 934-41 ft. and at 974-1,028 ft.

Bit 4 was not oriented into the well but was positioned at 883 ft. and, when it showed 1 point of weight at a pressure of 425 lb., drilling was started. Pump pressure was stepped up to 675 psi. and later dropped to 600 psi. When 30 ft. of horizontal hole had been made there was a very strong showing of gas on the ditch, sufficient to cause the fluid to froth over the mud ditch. This hole was carried to 48 ft. A second run of Bit 4 at 876 ft., after removing a 31-ft. single, made 23 ft. of horizontal hole. As the bit was pulled upward after removing the single, it was turned 90° clockwise and the pumps started with a pressure of 550 psi. Drilling was stopped on this hole at 23 ft. because of poor pump pressure and badly gas-cut mud.

Bit 5 was run to 881 ft. on a 30-ft. radius flexible curved joint 21 ft. in length. Above this were 95 ft. of straight flexible pipe and 765 ft. of 4½-in. full hole drill pipe. All holes were started in this manner although the length and radius of the flexible joint varied according to how the side hole was started. At this point the gas-cut mud was pumped into the sump and replaced. Drilling started with a pressure of 450 psi. and 0.5 point weight and at 25 ft. the line pressure was 550 to 600 psi. and the mud weighed 63 lb. At 30 ft., water was added to the fluid and at 40 ft. the viscosity was 35 seconds. At 80 ft., where drilling stopped, pressure was 225 psi. and the mud fluid was too gas-cut to handle and weighed 59 lb., viscosity 30 seconds.

Bit 6 made two runs, one for 75 ft. and a second for 35 ft. At this point additional mud was mixed consisting of 50 bbl. water, 10 sacks of Aquagel and 25 lb. tetra sodium pyrophosphate. This chemical was used only once. Drilling was started with a pressure of 500 psi. but was later increased to 600 psi. At 45 ft. mud foamed over the ditch and conductor pipe, the 7¼ by 14-in. pump then operating at 52 s.p.m. and the weight on the bit being 0.5 point. At 57 ft. new mud was added, a portion of the oil and gassy mud being dumped. At 60 ft. the line pressure was from 550 to 600 psi. and at 64 ft. there were strong oil and gas showings on the ditch with the pump operating at 62 s.p.m. Drilling was concluded on this run at 75 ft. For the second run of Bit 6, two singles were pulled and the drill pipe turned 180° clockwise and side hole made at 922 ft. At 15 ft., pressure dropped from 450 to 400 psi., the mud weighing 61 lb., and at 20 ft. there was a strong showing of oil and gas on the ditch. At 24 ft. the pressure was 350 psi. and the pump was operating at 75 s.p.m. Pressure continued to decrease and after drilling beyond 30 ft., the pressure was 275 psi., the mud 60.5 lb. and viscosity of fluid 30 seconds. The pump at this time was operating at 72 s.p.m. Drilling was concluded at 35 ft. due to a clogged bit.

During the drilling of the eight holes, the speed of drilling varied to some extent but actual drilling time while making hole averaged considerably more than 1 ft. per minute. In drilling with Bit 4, the 28 ft. from 20 ft. to 48 ft. were drilled in 11 minutes and during part of this time gas showings were strong enough to cause the mud fluid to froth.

**PRODUCTION RECORD—MIDWAY WELL NO. 16—SECTION 27-31S-22E—HORIZONTALLY DRILLED**

**Drilled in 1918.**

**Produced until 1928, then shut down as daily production was only 1 bbl., 12° to 14° gravity.**

**Seventeen years later, in June 1945, well was reopened and sidetracked.**

**Seven horizontal drain holes were drilled. Total length, 421 ft.**

**Fluid level stood 300 ft. high after holes drilled.**

**Pump operated at 4 s.p.m., 26-in. stroke.**

**Starting producing at 3 bbl. per day, with 50 per cent sand.**

**No accurate daily records were kept from July 16 to July 21, during changes in pumping cycles and experimental work.**

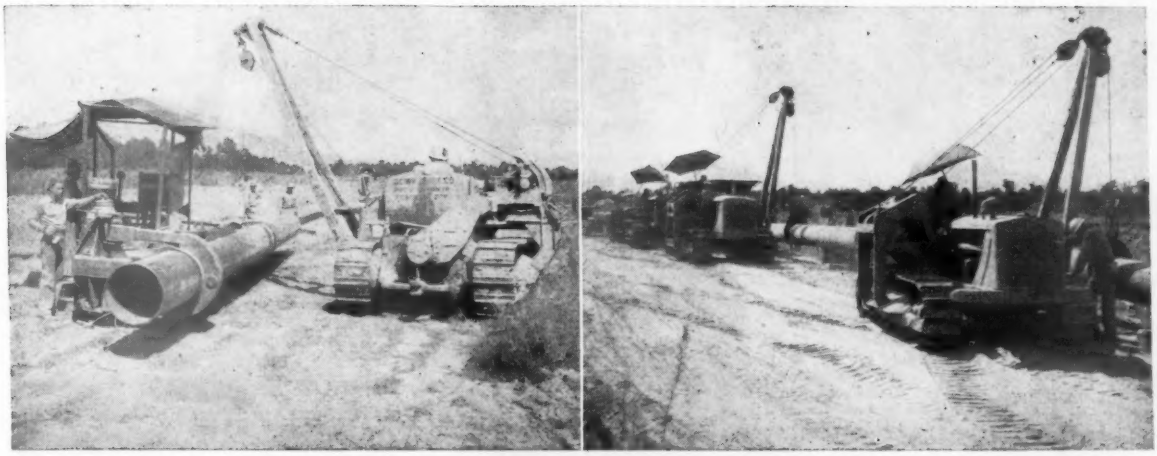
**Production records maintained from July 21 are as follows:**

| Date— | Bbl. | Gravity | Sand (%) |
|---|---|---|---|
| July— | | | |
| 21 | 12 | 12.9 | 35 |
| 22 | 13 | 12.9 | 35 |
| 23 | 14 | 12.9 | 35 |
| 24 | 18 | 12.9 | 35 |
| 25 | 22 | 12.9 | 35 |
| 26 | 21 | 12.9 | 35 |
| 27 | 14 | 12.9 | 20 |
| 28 | 13 | 12.9 | 15 |
| 29 | 12 | 12.9 | 15 |
| 30 | 20 | 12.9 | 15 |
| *31 | 13 | 12.9 | 15 |
| August— | | | |
| 1 | 20 | 12.9 | 15 |
| 2 | 20 | 12.9 | 15 |
| 3 | 20 | 12.9 | 15 |
| 4 | 20 | 12.9 | 15 |
| 5 | 19 | 12.9 | 15 |
| 6 | 18 | 12.9 | 15 |
| 7 | 18 | 12.9 | 15 |
| 10 | 22 | 12.9 | 10 |
| 11 | 22 | 12.9 | 10 |
| 12 | 22 | 12.9 | 10 |
| 13 | 22 | 13 | 10 |
| 14 | 22 | 13 | 10 |
| 15 | 20 | 13 | 10 |
| 16 | 25 | 13 | 10 |
| 17 | 25 | 13 | 10 |
| 18 | 23 | 13 | 8 |
| 19 | 26 | 13 | 8 |
| 20 | 26 | 13 | 8 |
| 21 | 26 | 13 | 8 |
| 22 | 21 | 13 | 8 |
| 23 | 24 | 13 | 8 |

***To this date, well produced some water. No water thereafter.**

**By pumping less sand, the pump is operated faster—thereby increasing production.**

**The above production figures are net barrels, exclusive of water and after sand was separated from the oil.**



*Left: Making cold bend with pipe-bending machine on United Gas Pipe Line Co.'s Carthage-Monroe 24-in. gas line. Right: Lining up pipe on elevated skids at side of ditch for welding into 2,500-ft. sections*

# Unusual Design Features United Gas Carthage Field-Monroe Line

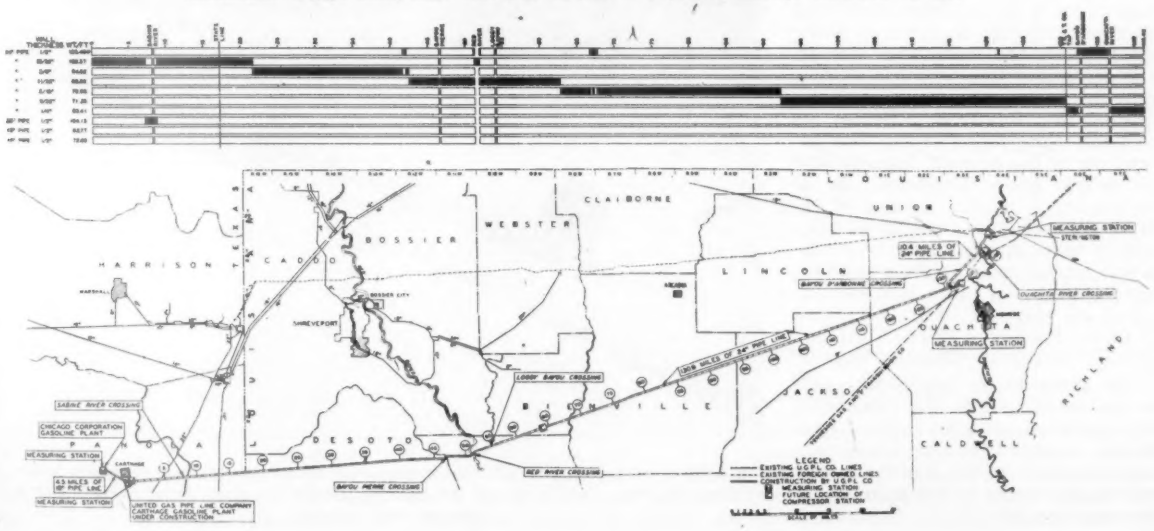
**by Neil Williams**

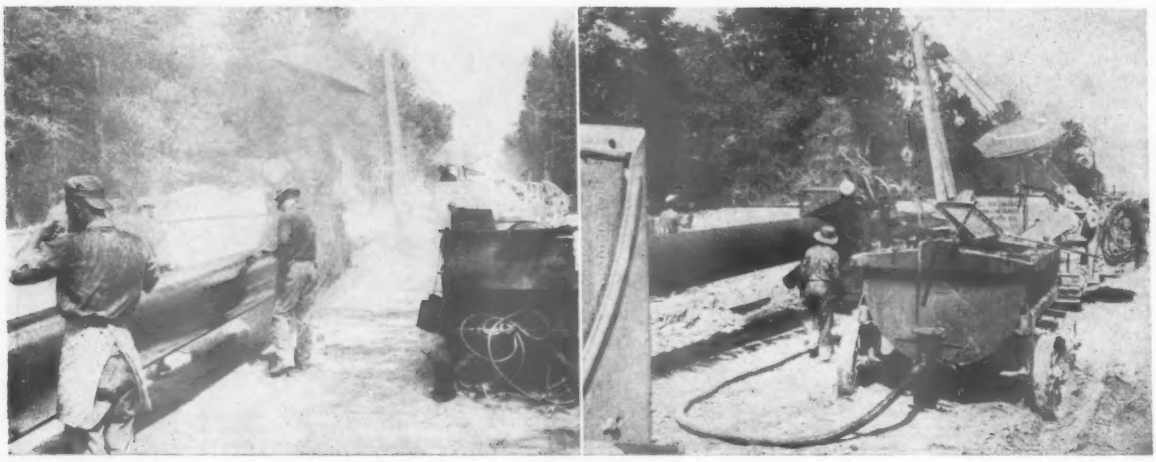
DESIGN of United Gas Pipe Line Co.'s new 24-in. gas-transmission system now being laid from the Carthage field, Panola County, eastern Texas, to Monroe, La., embodies a number of engineering features that are of special interest and significance in the light of modern trends in pipe-line construction and operating practices.

Rapid progress is being made in laying the line with full advantage being taken by contractors of favorable weather conditions to complete the project before late autumn and winter rains set in. With actual pipe work started less than 1½ months ago, the over-all project, exclusive of stream crossings, on September 1 was approximately one-third finished. Completion date has been set at November 1. Present rate of laying is from 2½ to 3 miles daily.

The main line totals approximately 142 miles. This starts at the company's natural-gasoline plant, now under construction, located south of the town of Carthage in the heart of the field. It extends northeasterly 130.9 miles to the West Monroe compressor station on Tennessee Gas & Transmission Co.'s 24-in. South

*Route of United Gas Pipe Line Co.'s Carthage-Monroe 24-in. gas line with corresponding plot (top) of the different weights and wall thicknesses of pipe being laid. Mile post on plot is keyed to mileage indicated on line*





*Left: Traveling combination cleaning and priming machine following welders. Crews hand-prime any places missed by machine. Right: Traveling coating and wrapping machine following cleaning and priming machine*

Texas - Appalachian district line, where a tap will be provided, and thence 10.4 miles further northeast to United's Sterlington station in the Monroe gas field.

Laying of the line is being done in three spreads. The first, handled by O. C. Whitaker Co., Fort Worth, extends from the Carthage field easterly to the Red River, a distance of 262,490 ft. This spread also includes the gathering system. O. E. Dempsey Construction Co., Tulsa, which has the second and middle spread, is working from a point southeast of Arcadia southwesterly to the Red River, a distance of 211,938 ft. Associated Contractors and Engineers, Houston, on the third spread, is working from the east end of the Dempsey section northeast to the Sterlington terminus.

Status of the various operations on each of the spreads, as of September 18, is given in the accompanying summary of progress.

The gathering system at Carthage will have a main loop, consisting of approximately 16 miles of 20-in. line circling the field, with laterals and secondary lines of various sizes, ranging from 16-in. down to 6-in., feeding into this from different directions. Nine miles of the loop already is in the ground. Laterals and secondary lines completed, as of September 1, totaled 7 miles of 12-in.; 4 miles of 10-in.; 5 miles of 8-in., and 17 miles of 6-in. Definitely proposed extensions of laterals and secondary lines yet to be laid include about 9½ miles of 16-in.; 6½ miles of 12-in.; 2 miles of 10-in.; 5½ miles of 8-in., and about 24 miles of 6-in.

Gas gathered by this system will be delivered first to the company's high-pressure gasoline plant, now under construction, for processing and extraction of the liquid content, and thence direct to the main 24-in. transmission line.

**CONSTRUCTION PROGRESS REPORT**

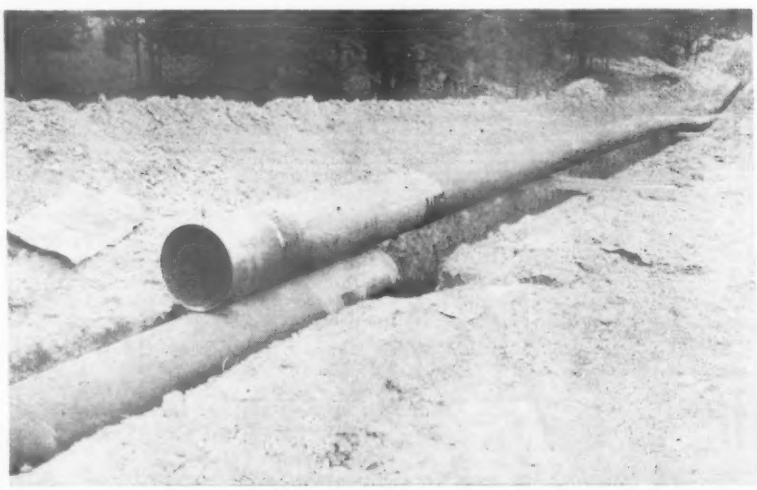
| | Section 1 (262,490 ft.) Crew progress* | | Section 2 (211,938 ft.) Crew progress* | | Section 3 (256,627 ft.) Crew progress* | | Total (731,055 ft.) Crew progress* | |
|---|---|---|---|---|---|---|---|---|
| | Today | To date | Today | To date | Today | To date | Today | To date |
| Clearing R.O.W. | | 271,396 | | 200,684 | 2,000 | 218,516 | 2,000 | 690,596 |
| Grubbing and grading | 5,900 | 207,345 | 4,000 | 189,484 | 2,300 | 188,516 | 12,200 | 585,345 |
| Hauling and stringing | 3,600 | 197,431 | 2,800 | 133,484 | 5,000 | 173,516 | 11,400 | 504,431 |
| Ditching | 6,700 | 192,221 | 4,000 | 99,484 | 2,000 | 150,116 | 12,700 | 441,821 |
| Lining and tacking | 7,000 | 187,421 | 4,800 | 95,084 | | 148,116 | 11,800 | 430,621 |
| Welding | 7,000 | 187,421 | 4,400 | 94,484 | | 148,116 | 11,400 | 430,021 |
| Number of welds | 175 | 4,664 | 112 | 2,407 | | 3,711 | 287 | 10,782 |
| Number of bends | 29 | 1,225 | | 599 | | 790 | 29 | 2,614 |
| Cleaning and priming | 7,200 | 185,421 | | 89,484 | 5,600 | 142,516 | 12,800 | 417,421 |
| Coating and wrapping | 7,200 | 185,421 | | 88,484 | 2,400 | 139,116 | 9,600 | 413,021 |
| Laying | 7,200 | 185,421 | 1,000 | 88,484 | 3,700 | 129,516 | 11,900 | 403,421 |
| Lowering in | 7,200 | 185,421 | 8,800 | 83,284 | 3,700 | 129,516 | 19,700 | 398,221 |
| Backfilling | 5,000 | 124,021 | 8,800 | 83,284 | 3,700 | 129,216 | 17,500 | 336,521 |
| Hwy. & R.R. crossings | | 14 | | 9 | | 11 | | 34 |

*Distances in feet.

In addition, an 18-in. line will be laid from the site of Chicago Corp.'s gasoline plant, also under construction, a distance approximately 4½ miles, to connect with the inlet of the 24-in. line at the United plant. This line will deliver residue gas from that plant for transmission to the Tennessee Gas & Transmission Co.'s tap at its Monroe compressor station on the latter's trunk line to the Appalachian district.

Another 18-in. line has been laid

*(Continued on page 113)*



*The 2,500-ft. welded sections lifted over ditch and allowed to contract overnight before welding into line. Excess pipe is left in each section for slack loops every 1,000 ft. through level country*

# Well-Producing Capacity and Pressure

*by Park J. Jones**

PART 6 OF A SERIES

**THE optimum rate of production depends on well-producing capacity. In the case of reservoirs from which oil is produced by evolved solution gas, reservoir pressure depends on gas-oil ratios and well producing capacity, on pressure. The decline in well producing capacity is faster than the decline of reservoir pressure. Declined pressure, decreased effective permeability to oil, increased viscosity and b.s. and paraffin make for a rapid decline of well-producing capacity. The effect of declined pressure on well producing can be offset by drilling a comparatively large number of producing wells. But the drilling of a comparatively large number of wells does not increase the initial reserve. It tends to maintain well-producing capacity. On the other hand, gas injection may be a less costly method of providing and maintaining well-producing capacity for some oil reservoirs. The deliverability of gas wells depends on operating wellhead pressures. A natural-gas reserve also depends on operating wellhead pressures. For some natural-gas reservoirs, the increase of reserve and deliverability relative to a compressor plant more than pays for plant investment and operating expenses. Natural gas reservoirs having water encroachment may have a MER. This MER results from an increase of reserve. The optimum rate of production may be less than the MER.**

### Pressure vs. Gas-Oil Ratios and Cumulative Recovery

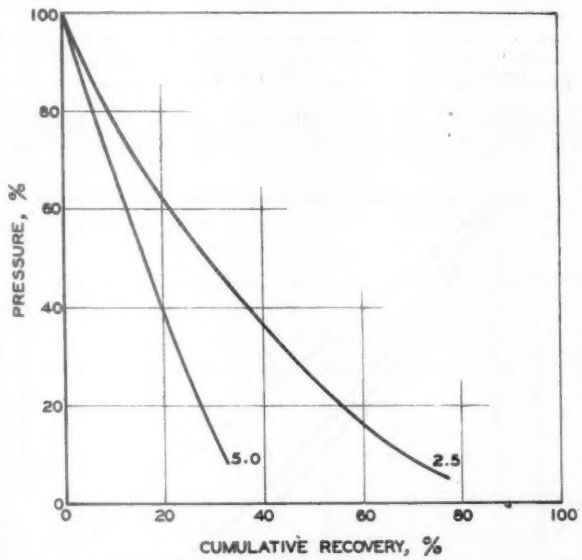
CONSIDER a saturated oil reservoir. The oil is saturated with gas but there is no initial gas cap. Denote the cubic feet of gas initially in solution by unity. For example, if there are 500 cu. ft. of gas in solution per barrel of oil, a gas-oil ratio of one would represent, in this case, 500 cu. ft. per bbl. If the oil were produced with a gas-oil ratio of 1,250 cu. ft. per bbl., the gas-oil ratio would be 2.5. If oil were produced with a ratio of 2,500 cu. ft. per bbl., the gas-oil ratio would be denoted by 5.0 and so on for other values.

The relationship between pressure and cumulative oil recovery, for a given reservoir having no water encroachment, depends on the gas-oil ratio. The curves in Fig. 6-1 illustrate this point for a particular reservoir. Pressure in per cent of the saturation pressure is plotted against cumulative recovery. Cumulative recovery is in per cent of initial reserve. Initial reserve is 45 per cent of the oil initially in place. The curve denoted by 2.5 shows the relationship between pressure and cumulative recovery for a produced gas-oil ratio equal to 2.5 times the solution gas-oil ratio. The curve denoted by 5.0 shows the relationship between pressure and cumulative recovery for a produced gas-oil ratio equal to five times the solution gas-oil ratio.

*Production consultant, Houston.

### Well-Producing Capacity vs. Cumulative Recovery

The well-producing capacity for reservoirs from which oil is dis-



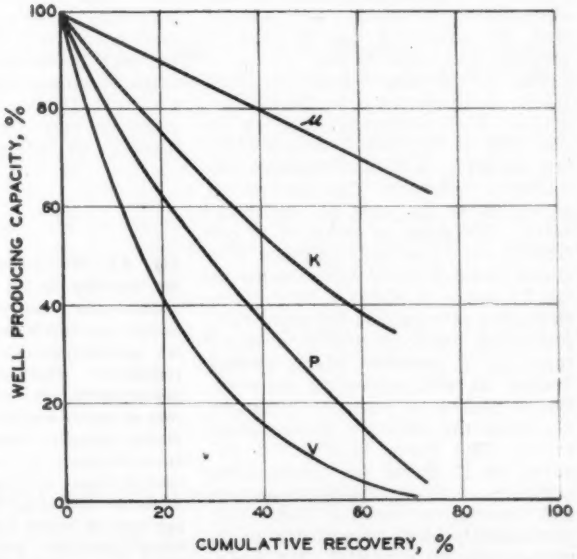
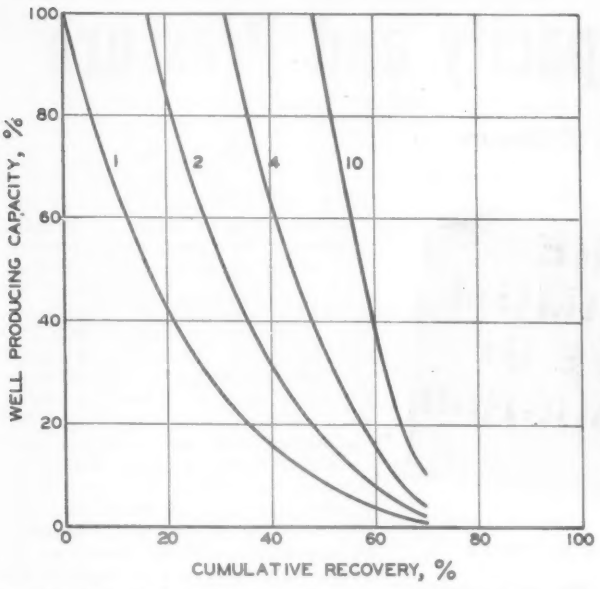




*Fig. 6-1—Reservoir pressure in per cent of saturation pressure vs. cumulative recovery and produced gas-oil ratio; cumulative recovery in per cent of initial reserve; initial reserve is 45 per cent of the oil initially in place; numerals indicate the ratio of produced gas-oil ratio to solution gas-oil ratio at saturation pressure. Fig. 6-2—Well producing capacity V in per cent of initial well producing capacity vs. cumulative recovery in per cent of initial reserve; initial reserve is 45 per cent of the oil initially in place; curves P, K and μ illustrate the respective effects of declining pressure, decreasing effective permeability and increasing viscosity on well producing capacity*



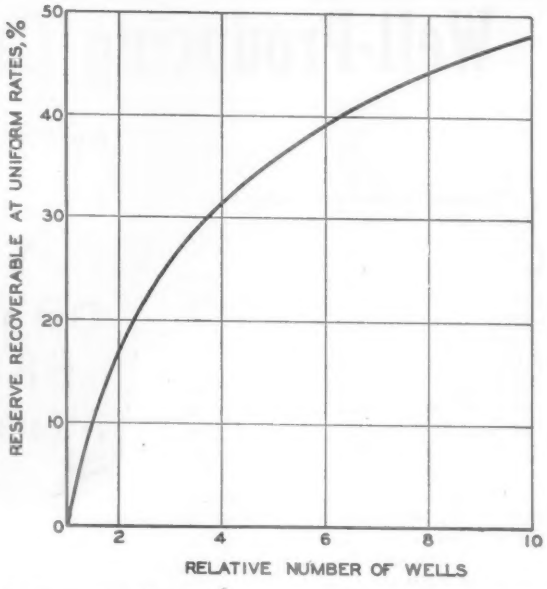




*Fig. 6-3—(Left) Well-producing capacity vs. cumulative recovery and relative number of wells; numerals represent relative number of wells. Fig. 6-4—(Right) Per cent of initial reserve recoverable at a uniform rate of production vs. relative number of wells for a reservoir from which oil is produced by evolved solution gas; the uniform rate of production is equal to the initial well-producing capacity of a unit number of wells. See Fig. 6-3*

placed by evolved solution gas depends on several factors. Among these, pressure is perhaps the most important one. The effective permeability to oil is probably next in the order of importance and viscosity third. These considerations are aside from mudding off pay and variations in pay thickness and permeability as between wells. We have noted in Fig. 6-1 that pressure decline depends on gas-oil ratios. To show the relationship between well-producing capacity and cumulative recovery, we assume that the produced gas-oil ratio is uniform and equal to 2.5.

The data in Fig. 6-2 are an illustrative example for a particular reservoir. Well-producing capacity, in per cent of the initial well-producing capacity, is plotted against cumulative recovery. Cumulative recovery is in per cent of initial reserve. The latter is taken at 45 per cent of the oil initially in place. The curve denoted by P is the same as the 2.5 curve in Fig. 6-1. This curve shows the relationship between well-producing capacity and cumulative recovery if pressure alone caused decline in well-producing capacity. But a decline in reservoir pressure decreases the effective permeability to oil. The curve in Fig. 6-2 denoted by K shows the relationship between well-producing capacity and cumulative recovery if effective permeability alone caused decline in well-producing capacity[1]. But a decline in reservoir pressure increases the viscosity of reservoir liquids. The curve denoted by $\mu$ shows the relationship between well-producing capacity and cumulative recovery if viscosity alone caused decline in well-producing capacity.

The V curve in Fig. 6-2 shows the resulting relationship between well-producing capacity and cumulative recovery. This curve reflects the composite effect of declining reservoir pressure, decreasing effective permeability to oil and increasing viscosity on well-producing capacity. These are only three of the possible factors causing decline of well-producing capacity. For the conditions here considered, reduction of permeability in the neighborhood of well bores by b.s. and reduction of per-well producing capacity by paraffin accumulation may also be significant. Decline of well-producing capacity may be attributed either directly, or indirectly, to decline of reservoir pressure. To provide well-producing capacity, we can either maintain pressure or drill additional wells.

### Number of Wells vs. Well-Producing Capacity

Suppose we drill 100 wells into a reservoir from which oil is produced by solution gas. In order to illustrate the relationship between well-producing capacity and number of wells, let the well-producing capacity for the 100 wells be defined by curve 1 in Fig. 6-3. Curve 1 is the same as the V curve in Fig. 6-2. Now, suppose we drill 200 wells instead of 100. The relative number of wells is two. If we drill 400 wells instead of 100, the relative number of wells would be 4 and so on for

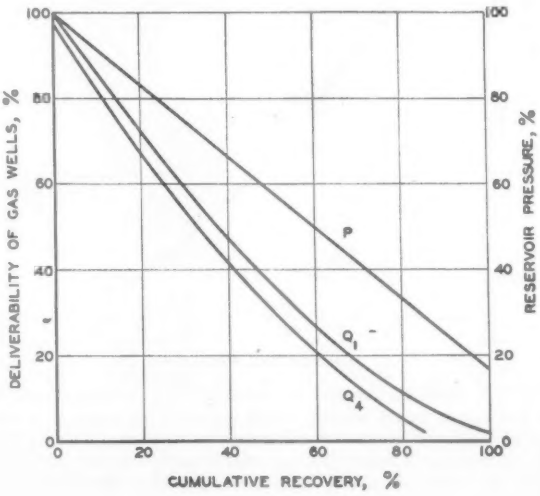



*Fig. 6-5—Well-producing capacity Q for a natural-gas reservoir having negligible water encroachment vs. cumulative recovery; deliverability in per cent of initial well-producing capacity; cumulative recovery in per cent of initial reserve; reservoir pressure in per cent of initial reservoir pressure; wellhead pressure for $Q_1$ is four times the wellhead pressure for Q.*

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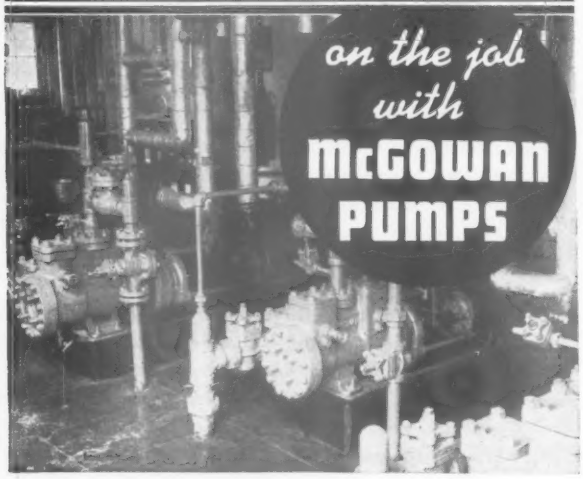


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any number of wells.

In Fig. 6-3, the curve denoted by unity defines the well-producing capacity of 100 wells. But, if curve 1 defines the well-producing capacity for 100 wells, the well-producing capacity of 200, 400, or 1,000 wells is not likely to be greater than 2, 4, or 10 times that of 100 wells. There are several reasons why the relative well-producing capacity can be less than proportional to the relative number of wells. Higher gas-oil ratios, location of wells, mudding off later wells to a greater extent than early wells because of declined reservoir pressure, are some of the factors against the proportionality. So the relationship between well-producing capacity and the number of wells in this example is not likely to exceed the well-producing capacity defined by curves 2, 4, and 10 in Fig. 6-3.

### Number of Producing Wells vs. Pressure Maintenance

If 100 wells are drilled and produced at capacity, production starts declining at the outset. If 200 wells were drilled and produced at a rate equal to the initial capacity of the 100 wells, about 16 per cent of the initial reserve would be recoverable before production would start declining. If 400 wells were drilled and produced at a rate equal to the initial capacity of the 100 wells, about 31 per cent of the initial reserve would be recoverable before production would start declining, and so on for any other number of wells. The curve in Fig. 6-4 illustrates this point. The reserve recoverable at uniform rates of production is plotted against the relative number of wells. This curve represents the first points on the curves of Fig. 6-3.

If we drill a large number of wells and then restrict the per-well producing rate, a fraction of an initial reserve is recoverable before production starts declining. From the viewpoint of optimum rates of production, a reserve recoverable at uniform rates of production has a higher present value than the same reserve recoverable at declining rates of production provided operating expenses and investments are the same. But investments and operating expenses increase as the number of wells is multiplied. On the other hand, the drilling of additional wells is not the only available method of providing well-producing capacity. Pressure maintenance by gas injection may be a less costly method of providing and maintaining well-producing capacity for some oil reservoirs. For most oil reservoirs, the optimum condition is some combination of number of producing wells, gas injection, and an operating reservoir pressure which is some fraction of the saturation pressure. If water is available for injection, still another element of optimum producing rates arises because oil recovery by water displacement is higher than by gas displacement.

### Deliverability of Natural Gas Wells

Consider the well-producing capacity of natural-gas reservoirs. The reservoir pressure is approximately proportional to reserve aside from water encroachment. The line in Fig. 6-5 denoted by P is an illustrative example. Reservoir pressure, in per cent of the initial reservoir pressure, is plotted against cumulative recovery. The pressure at abandonment depends on the ratio of initial reserve to gas initially in place. Other things equal, the initial reserve depends on the operating wellhead pressure.

The $Q_1$ curve in Fig. 6-5 illustrates the well-producing capacity for a particular natural-gas reservoir. The deliverability of 20 gas wells against a uniform wellhead pressure is plotted against cumulative recovery. Deliverability is in per cent of the initial deliverability. The $Q_4$ curve shows the deliverability for the same 20 wells but against a uniform wellhead pressure which is 4 times the wellhead pressure for the $Q_1$ curve. Encroachment of water into the reservoir of this example was negligible.

### Natural Gas Reserve vs. Wellhead Pressure

The well-producing capacity illustrated by the $Q_1$ curve in Fig. 6-5 is relative to a compressor plant. The 100 per cent reserve is also relative to a compressor plant. The well-producing capacity illustrated by the $Q_4$ curve is relative to line pressure. The 85 per cent reserve is relative to line pressure, that is, the reserve for 20 wells producing against line pressure at abandonment is only 85 per cent of the reserve for the same wells producing against a pressure which is only one-fourth of the line pressure.

In this example, 15 per cent of the reserve relative to a compressor plant plus the higher deliverability more than paid for the plant investment and the plant operating expenses. This is only a particular example. More generally, a natural-gas reserve relative to no water encroachment depends on the operating wellhead pressure. The deliverability of gas wells, the reservoir pressure at abandonment, and the reserve relative to operating wellhead pressure at abandonment may be estimated by the Ferguson method[2]. The optimum pressure is the wellhead pressure for which the rate of production is optimum. The procedure for estimating the optimum rate of production from natural gas reservoirs will be considered in later articles.

### The MER for Natural-Gas Reservoirs

But if water encroaches into a natural-gas reservoir, the reserve and the well-producing capacity relative to a fixed wellhead pressure are usually higher than they would be relative to no water encroachment. In this case, deliverability could also depend on the rate of take because the rate of water encroachment depends not only on pressure difference but also on the time interval during which a given pressure difference is effective[3]. If water encroaches, the space occupied by the gas remaining in a reservoir decreases. As a consequence, the pressure exerted by remaining gas is higher than it would be relative to no water encroachment. Well-producing capacity for natural-gas reservoirs tends to be maintained by water encroachment. A given number of wells properly located relative to water may have a higher deliverability and a higher reserve than the same number of wells could have relative to no water encroachment provided the rate of production is not excessive.

From this viewpoint, natural-gas reservoirs are said to have a MER. This MER does not result from water bypassing gas. It results from an increase of gas reserve. The present value of the gas recoverable from a given reservoir at MER may be higher than the present value of the gas recoverable from the same reservoir at some rate which is faster than the MER. If so, the optimum rate of production would numerically be equal to the MER. On the other hand, if the MER were high enough (rapid water encroachment) the optimum rate of production could be significantly less than the MER.

### References


1. The Oil and Gas Journal, April 7, 1945, p. 91.
2. Ferguson, J. W., The Oil and Gas Journal, Jan. 19, 1939.
3. Hurst, W., A.I.M.E., 1943.


**H. R. Kemmerer,** formerly chief chemist at the Wood River, Ill., refinery of Shell Oil Co., Inc., has been named research director of the manufacturing research laboratory in Houston. Kemmerer joined Shell in 1935 as a junior mechanical engineer at Wood River. In succession he was promoted to senior research engineer, senior applications engineer, head of the products application department, chief research chemist, and chief chemist.

**Bob Franklin** has resigned as superintendent of J. R. Sharp Drilling Co., in Midland, Tex., to become an independent operator.

# Conroe Field Presents Good Example of Benefits of Conservation Principles

*by Charles J. Deegan*

**Here is the story of a field which in 10 years since its discovery had produced 30 million barrels, and which, during the next 3 years, while the nation was at war, produced 56 million barrels. Its current rate has been exceeded only once, when it was first being developed.**

THE Conroe field in Montgomery County, Texas, is an outstanding illustration of the benefits a nation can derive in time of emergency from an oil field that has been operated in accordance with sound conservation principles. Almost 10 years old when war broke out, the Conroe field had produced 30 million barrels in the 3 years immediately preceding the war. In the next 3 war years, it produced 56 million barrels of sorely needed crude for refineries making 100-octane gasoline.

Prior to V-J day, it was producing 22 million barrels per year, or a daily average of 62,000 bbl., a rate that has been exceeded only during one 6-month period in 1933 when the field was first being developed. This rate equals 75 per cent of the 1944 production for the entire country of Romania, some of whose refineries and fields may well have been bombed by Allied planes fueled with 100-octane gasoline produced from Conroe crude.

### Conservation History

Conroe was discovered in 1932, and its conservation history is typical of the early days of trial and error, legal problems, and differences of opinion among the operators. In June 1932, with fewer than six producing wells, emergency orders were issued by the Texas Railroad Commission, establishing drilling practices, casing procedure, and well spacing.

By February 1933, several major infractions had developed as a result of contention among the operators, and after hearings, the Railroad Commission adopted an allocation of 22,000 bbl. production per day, based on acreage, treating each 20-acre tract as a unit; wells on less than 20 acres were reduced proportionately. This permitted a daily average of about 200 bbl. per well, but by March, additional completions reduced this to about 100 bbl.

Injunction suits were filed attacking the acreage allocation plan, but prior to the hearing, the method was changed to one of 50 per cent of the allowable based on acreage and 50 per cent based on 24-hour well-potential tests. In July 1933, the courts upheld the authority of the commission, and in 1934 a set of field rules and regulations was put into effect. These regulations remained unchanged, other than varying the total allowable from time to time, until December 1942 and February 1943.

The principal changes made in 1942 and 1943 were provisions under which high-gas-oil-ratio wells could be shut in and their allowables transferred to other wells on the same lease, limiting gas wells producing from the same reservoir as oil wells to a gas withdrawal equivalent to the total volumetric withdrawal of an oil well producing with a gas-oil ratio of 2,000 cu. ft. per barrel. A further provision affecting the upper Cockfield sand, the less important oil producer, allows gas wells in this sand to produce an additional amount of gas for gas-lift purposes, only when the input gas-fluid ratio does not exceed 1,500 cu. ft. per bbl.

### Geology

The cross-section in Fig. 1 shows the geological conditions in the reservoir. The structure is roughly circular in shape, with three major faults in the heart of the field, and three peripheral faults on the east edge. The major faults have their maximum displacement in the heart of the field, fading out at the west edge; maximum displacements being about 130 ft. for the most northerly fault, and about 165 ft. for the other two. The structural relief increases with depth from a dubious expression at the surface to a closure of about 360 ft. in the Cockfield member.

There are two oil pays at Conroe, the upper Cockfield and the main Conroe sand. Of these the upper Cockfield has produced less than 10 per cent of the oil, and has an even smaller percentage of the future reserves. The remainder of this article will therefore deal with the main Conroe sand, which is part of the Yegua formation, in the Cockfield member of the Claiborne series of Eocene age.

The main Conroe sand is found at from 175 to 210 ft. below the top of the Cockfield, occurring through-

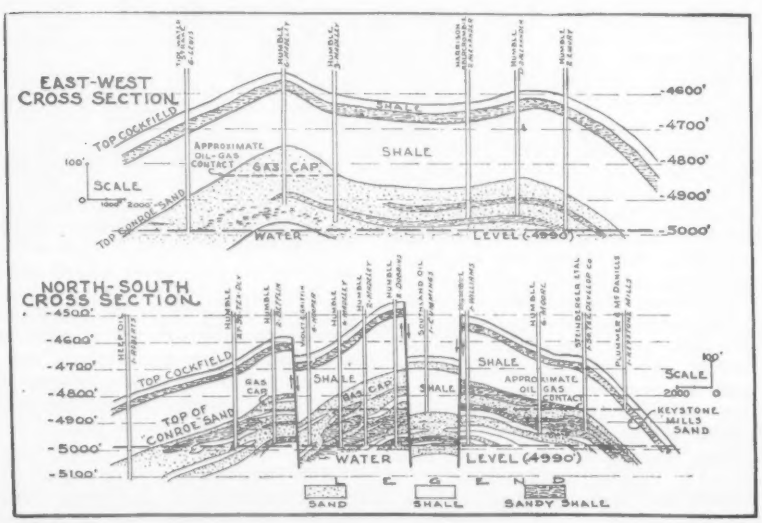


*Fig. 1—Cross sections of Conroe field. (After Michaux). Courtesy A.A.P.G.*

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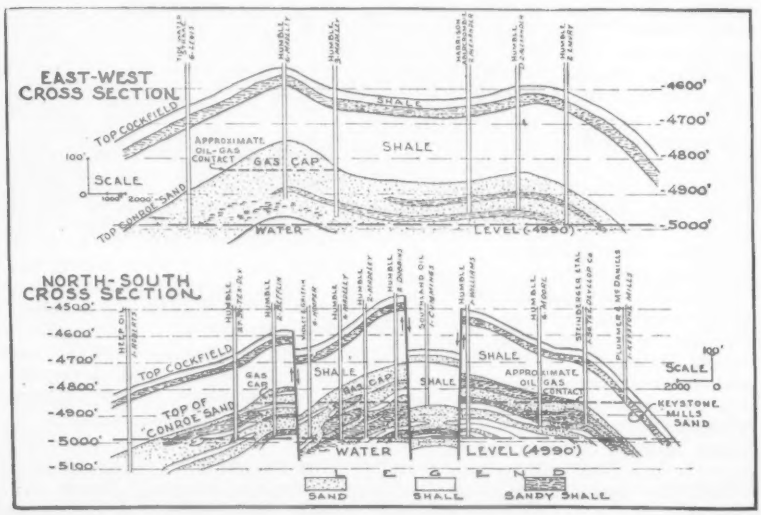


*Fig. 1—Cross sections of Conroe field. (After Michaux). Courtesy A.A.P.G.*

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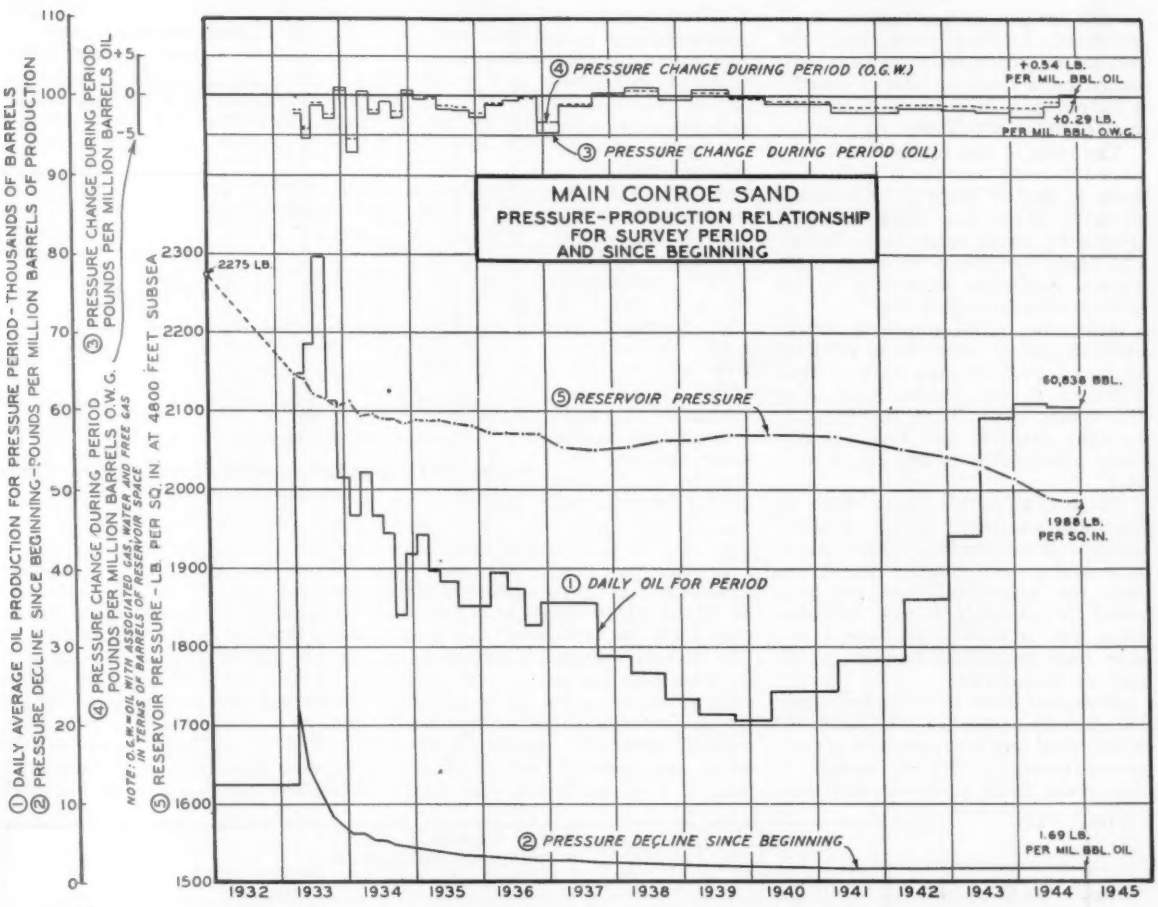
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① DAILY OIL FOR PERIOD
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1.69 LB. PER MIL. BBL. OIL
1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945

*Fig. 2—Main Conroe sand—engineering data. Courtesy Conroe Operators Association*

out a 250-ft. interval, and is composed of fine to medium textured quartz grains, with a variable shale and clay content. The average oil pay zone thickness is about 60 ft. Saturation in the main Conroe sand extends to about 300 ft. of closure, with approximately 170 ft. of gas, and 130 ft. oil saturated. Porosity averages about 28 per cent and permeability about 260 md.

The original gas-oil contact in general lay between —4,850 and —4,860 ft., with some variations resulting from faulting and the relative tightness or coarseness of the pay sand. Faulting and tightness are related. In some coarse-textured sand, oil saturation with no gas contact was found as high at —4,835 ft. The original oil-water contact was —4,990 ft.

Deep sand possibilities at Conroe have been dimmed since G. W. Strake drilled 1-W Krohn "B," 660 ft. out of the southeast corner of the S. H. Bryan Survey, on the west side of the field. This well was originally drilled as a Wilcox test, to a total depth of 12,020 ft. in January 1945. A series of electric logs was made from the surface casing seat at 1,301 ft. to the total depth. No production was found in the sands below the Conroe, and the well was completed as an oil well in the main Conroe sand on February 26, 1945.

### Results of Engineering Work

It required more than good rules and regulations on paper to achieve the results that were potentially available from conservation at Conroe. An understanding of the geology of the complex underground conditions in the reservoir, and intelligent analysis plus practical application of sound engineering principles were required to implement the regulations. This understanding, analysis, and practical application have been achieved at Conroe, not immediately, but gradually as a result of hard work and intelligent study.

The charts in Figs. 2 and 3 sum up the results of this effort. Starting with a reservoir of oil, squeezed between a gas cap and a water drive, with an initial reservoir pressure of 2,275 psi., more than 170 million barrels of oil have been produced with an over-all pressure loss

**TABLE 1—MAIN CONROE SAND—PRESSURE CHANGES VS. RATE AND VOLUME OF OIL WITHDRAWALS**

| Time period— | Daily avg. production | Million bbl. produced | Lb. pressure change | Pressure change, lb./ million bbl. | Fig. 4, point No. |
|---|---|---|---|---|---|
| 6- 1-33 to 11-26-33 | 70.332 | 12.660 | —35 | —2.76 | 1 |
| 11-26-33 to 8- 1-34 | 52.861 | 12.110 | —15 | —1.24 | 2 |
| 8- 1-34 to 6- 1-35 | 62.147 | 12.616 | —2 | —0.16 | 3 |
| 6- 1-35 to 6- 1-36 | 37.337 | 13.628 | —17 | —1.25 | 4 |
| 6- 1-36 to 10- 1-37 | 36.019 | 17.541 | —21 | —1.20 | 5 |
| 10- 1-37 to 10- 1-38 | 28.124 | 10.265 | +13 | +1.27 | 6 |
| 10- 1-38 to 5- 1-40 | 22.017 | 12.704 | +7 | +0.55 | 7 |
| 5- 1-40 to 5- 1-41 | 24.519 | 8.950 | —3 | —0.34 | 8 |
| 5- 1-41 to 5- 1-42 | 28.451 | 10.835 | —17 | —1.64 | 9 |
| 5- 1-42 to 1- 1-43 | 36.207 | 8.871 | —10 | —0.89 | 10 |
| 1- 1-43 to 7- 1-43 | 44.171 | 7.995 | —10 | —0.80 | 11 |
| 7- 1-43 to 1- 1-44 | 59.409 | 10.931 | —19 | —1.74 | 12 |
| 1- 1-44 to 1- 1-45 | 60.948 | 22.307 | —26 | —1.17 | 13 |
| Total for period | | 160.961 | —161 | *—1.00 | |

*Weighted average.

of 1.69 lb. per million barrels of oil produced. Of this production, the last 161 million barrels has been produced on a basis of almost exactly 1 lb. pressure drop per million barrels of oil. (See Table 1.)

The bulk of this oil has been produced at rates that ran a cycle, (see Line 1, Fig. 2) from a 1933 maximum of 80,000 bbl. daily, through gradually lower rates to a 21,000-bbl. daily minimum in early 1940, thence gradually increasing to its wartime high of 61,000 bbl.

After the initial stages of development, gas-oil ratios were reduced to an over-all average of less than 1,000 cu. ft. per barrel, then over the years (see Line 6, Fig. 3) brought down to and kept consistently around 500 to 600 cu. ft. per bbl.

There is an active water drive in the field, and the reservoir is sufficiently homogeneous, that given time and proper engineering attention, the water, oil, and gas cap seem to establish a new equilibrium and relatively uniform pressure zone gradations for any given rate of withdrawal.

However, there is a marked time lag between changes in rates of withdrawal and readjustment of reservoir pressures. Fig. 4, based on data from Table 1, shows that this time lag results in comparatively poor correlation between rates of withdrawal and pressure changes, even when average periods are selected that give a combination of minimum range in volume of total withdrawals at not too wide a variation in the daily rates. Possibly material balance calculations, with all past data from Fig. 3 put through an analyzer, might enable fairly accurate predictions to be made of the ultimate effect of any particular rate of fluid withdrawal.

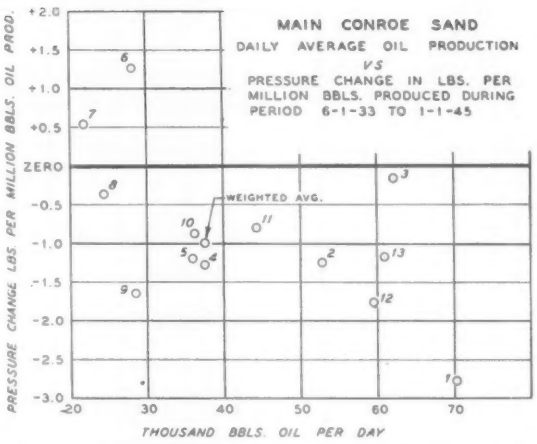


*Fig. 4—Main Conroe sand—engineering data. Courtesy Conroe Operators Association*

Lacking such data, it can only be observed that at production rates of 25,000-30,000 bbl. daily of oil plus 5,000 bbl. of water, the reservoir pressure showed a tendency to increase. Starting late in 1940, when withdrawal rates began increasing, pressures started a relatively sharp decline, until the middle of 1944, when they checked, and as of January 1, 1945, showed a very slight upturn.

From Table 1 it will be observed that the last 22 million barrels of oil produced at a rate of 60,948 bbl. daily resulted in a drop of only 1.17 lb. per million barrels, compared to a 1.74-lb.-per-million drop while producing the preceding 10,931,000 bbl. at a rate of 59,409 bbl. daily. In Fig. 5, an isobar map of the reservoir pressures as of January 1, 1945, the distribution of the high

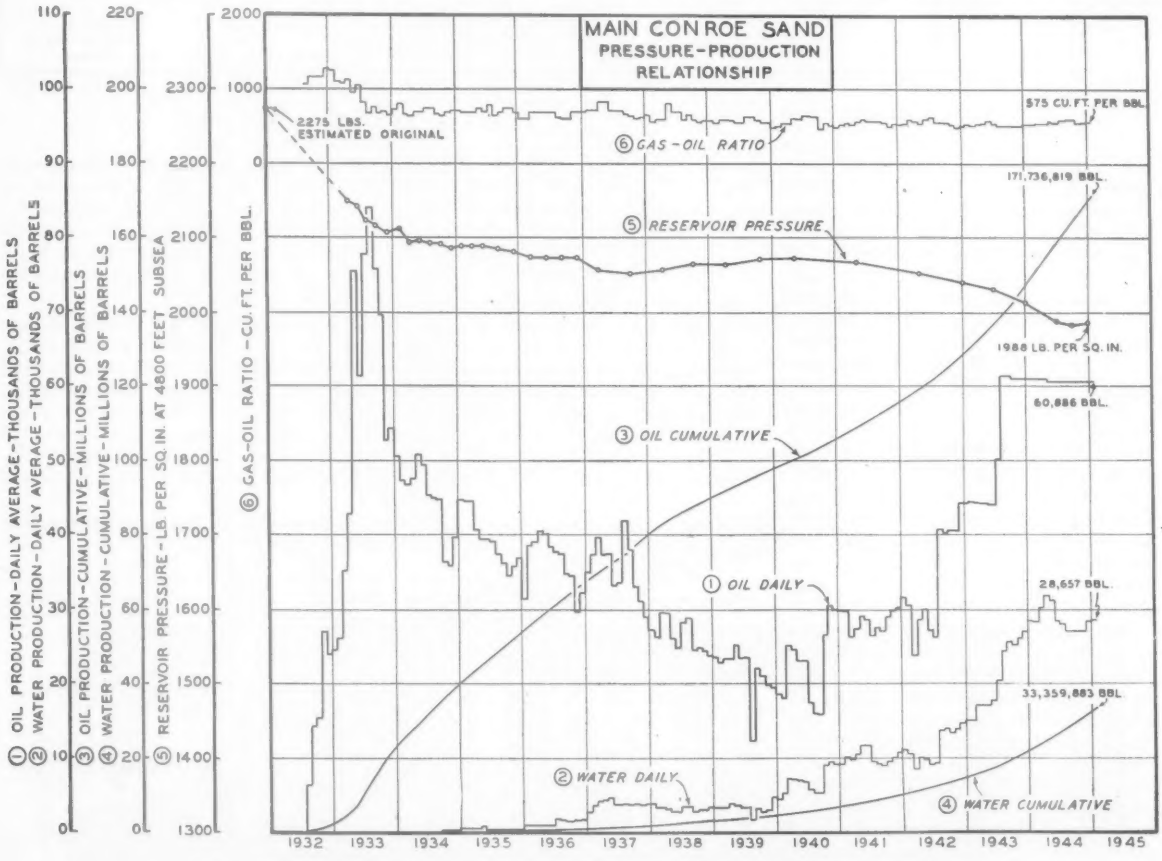


*Fig. 3—Main Conroe sand—engineering data. Courtesy Conroe Operators Association*

and low-pressure zones in the sand, and the general pattern of the contours are quite similar to those made at various times in the past, the only important difference being that all pressures are now lower. This is an encouraging indication that conditions in the reservoir are adjusting themselves to the higher rates of withdrawals.

There is a very large reserve in this field, the recoverable reserves of the main Conroe sand alone having been estimated at 430 million barrels on January 1, 1945. Therefore now that the war is over and it is no longer necessary to push the field's production, the engineers will no doubt make a new study to determine a long-range maximum efficient rate.

| RESERVOIR | | MAIN CONROE | U. COCKFIELD |
|---|---|---|---|
| FIRST WELL COMPLETED | | 1-1-32 | 10-1-32 |
| ORIGINAL RESERVOIR PRESSURE AT 4800 FT SUBSEA | LBS./SQ.IN. | 2250 | 2250 |
| AVERAGE PRESSURE EFFECTIVE 1-1-45 | LBS./SQ.IN. | 1988 | 1145 |
| LAST PRESSURE EFFECTIVE 10-1-44 | LBS./SQ.IN. | 1985 | 1192 |
| DAILY RATE OF PRODUCTION | BARRELS | 60,838 | 2386 |
| CHANGE IN DAILY RATE OF PRODUCTION | BARRELS | +28 | -37 |
| CHANGE IN PRESS./MIL. BBLS. SINCE LAST SURVEY | LBS./SQ. IN. | +0.54 | -214 |
| CHANGE IN PRESS./MIL. BBLS. SINCE BEGINNING | LBS./SQ. IN. | -1.69 | -71.6 |
| CUMULATIVE PRODUCTION | BARRELS | 169,849,367 | 15,414,704 |
| SOURCE OF INFORMATION CONROE ENGINEERING COMMITTEE | | | |

CONROE FIELD ISOBARIC MAP — CONROE ENG. COMMITTEE

MAIN CONROE SAND ONLY

ORIGINAL RESERVOIR PRESSURE AT 4800' SUBSEA 2275 LB./SQ.IN.
AVERAGE PRESSURE EFFECTIVE Jan. 1, 1945 1988 LB./SQ.IN.
AVERAGE PRESSURE EFFECTIVE Oct. 1, 1944 1985 LB./SQ.IN.
DAILY RATE OF PRODUCTION
OIL 60,838 BBLS., WATER 27,581 BBLS., GAS 33442 MCF
CHANGE IN DAILY RATE OF PRODUCTION
OIL + 28 BBLS., WATER + 107 BBLS., GAS - 1,217 MCF
CHANGE IN PRESSURE/MIL. BBLS. SINCE LAST SURVEY + 0.54 LB./SQ.IN.
CHANGE IN PRESSURE/MIL. BBLS. SINCE BEGINNING - 1.69 LB. SQ.IN.
CUMULATIVE PRODUCTION TO Jan. 1, 1945
OIL 169,849,367 BBLS., WATER 32,471,516 BBLS., GAS 116,262,389 MCF

*Fig. 5—Isobaric map, main Conroe sand, January 1, 1945. Courtesy Conroe Operators Association*

# QUESTIONS on TECHNOLOGY

**by W. L. Nelson**
Consulting Engineer

## Lead Response—Straightrun and Natural Gasoline

**Now that refiners must use more lead in order to make 75-octane-number gasoline we would like to see a comprehensive summary of the lead susceptibilities of various refinery stocks so that we can select what processes to use in making our gasoline. We are aware that each stock differs in lead susceptibility from other stocks but we believe the general relationships are still of great value.—L. B. W.**

**The question here asked is a pertinent one but so much space is required that the answer must be presented in two installments. Data are presented in this installment on the behavior of straightrun stocks and natural gasoline. Next week similar tabulations on desulfurized stocks, cracked gasolines, Houdry catalytically cracked gasoline, and aromatic stocks will be presented. In all, over 280 sets of lead susceptibility data will be tabulated.**

Comparisons of lead susceptibility are dangerous because there are always exceptions to the average behavior. These discrepancies are not mysterious differences because they are due mainly to differences in clear octane number, boiling range, amount of sulfur, kind of sulfur, etc., rather than vital differences in the hydrocarbons that compose the stock. Thus, Table 4 is the most consistent of the tabulations because the materials listed in it have about the same sulfur content, and are in other respects similar to one another. The average values of Table 4 are correct within ±3.8 octane-number units. Furthermore; Items 2, 7, 13, and 16 in Table 4 are not truly representative because 2, 7, and 16 contain only low percentages of sulfur and Item 13 probably contains more sulfur than any gasoline on the market. If these items (2, 7, 13 and 16) are left out the accuracy of the average values is in error by only ±2 octane-number units.

Unfortunately, Tables 1, 2, and 3 are not as accurate as Table 4. The average lead susceptibilities are in error by ±5 and occasionally by as much as 8 or 9-octane-number units. Much of this inaccuracy is due to the inclusion of samples whose sulfur contents were not known and perhaps they properly belong among the high-sulfur gasolines of Table 4.

**Effect of sulfur.**—The 55.9-octane-number low-sulfur gasolines of Table 3 and the 55.9-octane-number high-sulfur gasolines of Table 4 show that sulfur decreases the lead susceptibility about as follows:

| | |
|---|---|
| With 1 cc. TEL | 2.2 units |
| With 2 cc. TEL | 3.3 units |
| With 3 cc. TEL | 4.0 units |
| With 4 cc. TEL | 4.5 units |
| With 6 cc. TEL | 5.2 units |

**Effect of clear octane number.**—Table 3 permits examination of the effect of octane number on the effectiveness of the lead. Smoothed (and crossplotted) data indicate the following increases in octane number for low-sulfur stocks:

| | | | | |
|---|---|---|---|---|
| None | 40 | 50 | 60 | 70 |
| 1 cc. | 11.2 | 10.2 | 9.3 | 8.4 |
| 2 cc. | 17.3 | 15.6 | 13.9 | 12.2 |
| 3 cc. | 22.1 | 19.5 | 16.9 | 14.4 |
| 4 cc. | 25.2 | 22.2 | 19.3 | 16.3 |

**Natural gasoline.**—The susceptibility of natural gasoline may be slightly better than that of comparable straightrun gasoline but the data show no marked differences.

See Tables 3 and 4 on following pages.

TABLE 2—LEAD SUSCEPTIBILITY OF NATURAL GASOLINES

| No. | Kind of stock or source— | A.P.I. | Per cent sulfur | Oct. No. | Increase in octane number (A.S.T.M., Motor or 1-C) 1 cc. | 2 cc. | 3 cc. | 4 cc. | Ref. |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Borger, Texas | | | 67 2 | 8.4 | | 14.7 | 16.7 | 2 |
| 2. | Borger, pentane-free | | | 59.2 | 7.7 | | 15.1 | | 2 |
| 3. | Hobbs, Texas, pentane-free | | | 65.6 | 5.8 | 10.4 | | | 2 |
| 4. | 18-lb. | | | 71.0 | 4.8 | 7.6 | | | 3 |
| 5. | Pentane-free | | | 54.7 | 5.9 | | 12.4 | | 3 |
| 6. | Pentane-free distillate | | | 52.2 | 7.2 | | 14.9 | | 3 |
| 7. | High sulfur | | 0.26 | 51.4 | 6.1 | 9.8 | (12.3) | | 4 |
| 8. | West Texas | | 0.011 | 73.7 | 10.9 | 13.6 | | | 5 |
| 9. | West Texas | | 0.01 | 72.1 | | 13.6 | | | 5 |
| 10. | West Texas | | 0.01 | 73.8 | 11.1 | 14.1 | | | 5 |
| 11. | West Texas | | 0.01 | 72.8 | | 13.4 | | | 5 |
| 12 | Gray and Hutchinson Co., Texas, vapor recovery | | | 71.0 | 4.0 | 7.0 | 8.5 | | 1 |
| 13. | Gray and Hutchinson Co., Texas, 14-lb. | | | 67.0 | 8.0 | 12.0 | | | 1 |
| 14 | Gray and Hutchinson Co., Texas, 12.5-lb. | | | 65.5 | 8.5 | 12.5 | | | 1 |
| 15. | Burbank, Okla., 11.5-lb. | | | 65.0 | 11.5 | 15.5 | 18.0 | | 1 |
| 16. | Okla. City and W. Kans., 13.4-lb. | | | 74.6 | 4.4 | 5.4 | 6.4 | | 1 |
| 17. | 7-lb. | | | 60.5 | 9.8 | 17.1 | 21.5 | 23.3 | 1 |
| 18. | 13-lb. | | | 67.2 | 8.5 | 15.3 | 18.4 | 20.0 | 1 |
| 19. | Special cut | 56 | | 51.8 | 5.2 | 10.5 | 15.9 | 21.2 | 1 |
| 20. | 12-lb. | | 0.037 | 67.2 | 7.8 | 12.3 | 14.8 | 16.8 | 1 |
| 21. | 12-lb. | | 0.002 | 69.5 | 11.5 | 15.3 | 18.0 | 20.0 | 1 |
| 22. | 26-lb. | | 0.005 | 72.0 | 13.4 | 15.4 | | | 1 |
| 23. | 18-lb. | | 0.005 | 66.7 | 14.3 | 19.3 | | | 1 |
| 24. | 13-lb. | | 0.01 | 62.7 | 14.3 | 20.1 | 22.6 | | 1 |
| | Average | | | 65.6 | 8.6 | 13.0 | 14.7 | | |
| | Smoothed | | | 65.7 | 8.4 | 12.4 | 14.8 | 16.8 | |
| | Average leaving out items 7, 12, 13, 14 and 17 | | | 66.5 | 9.25 | 13.9 | 15.4 | | |
| | Smoothed | | | 66.5 | 9.0 | 13.3 | 15.9 | 17.6 | |

() Parenthesis means an estimated figure.

TABLE 1—SUMMARY OF LEAD SUSCEPTIBILITIES

| | Oct. No. | Increase in A.S.T.M. Oct. No. with 1 cc. | 2 cc. | 3 cc. | 4 cc. | 6 cc. | No. of tests |
|---|---|---|---|---|---|---|---|
| Desulfurized straightrun | 54.5 | 14.9 | 21.3 | 25.2 | 27.9 | 31.8 | 20 |
| Desulfurized natural | 61.6 | 13.6 | 19.6 | 23.1 | 25.5 | 28.9 | 6 |
| Straightrun—low sulfur | 43.4 | 10.7 | 16.9 | 21.1 | 24.0 | 28.2 | 12 |
| Straightrun—low sulfur | 55.9 | 9.7 | 14.6 | 17.7 | 19.8 | 22.9 | 26 |
| Straightrun—low sulfur | 64.0 | 9.4 | 13.9 | 16.6 | 18.5 | 21.1 | 28 |
| Straightrun—low sulfur | 71.6 | 8.0 | 11.8 | 13.8 | 15.3 | 17.4 | 12 |
| Natural gasoline | 65.7 | 8.4 | 12.4 | 14.8 | 16.8 | 18.8 | 38 |
| Straightrun—high sulfur | 55.9 | 7.5 | 11.3 | 13.7 | 15.3 | 17.7 | 23 |
| Desulfurized cracked | 69.9 | 8.3 | 10.4 | 11.7 | 12.6 | 13.7 | 6 |
| Isooctane mixes* | 83.0 | 8.1 | 11.6 | 14.1 | 16.2 | 18.4 | *8 |
| Cracked—low octane | 57.5 | 8.1 | 12.2 | 14.7 | 16.5 | 18.9 | 4 |
| Cracked—regular | 64.5 | 6.5 | 9.5 | 11.3 | 12.6 | 14.4 | 38 |
| Cracked—high octane | 71.6 | 4.0 | 5.8 | 6.9 | 7.6 | 8.6 | 16 |
| Aromatic gasolines | 72.6 | 6.2 | 9.0 | 10.6 | 11.6 | 13.2 | 13 |
| Houdry catalytic | 75.8 | 5.9 | 8.5 | 9.9 | 10.9 | 12.4 | 30 |
| | | | | | | | 280 |

*Taken from The Oil and Gas Journal, page 70, November 27, 1941.

**TABLE 3—LEAD SUSCEPTIBILITY OF STRAIGHTRUN GASOLINES (LOW SULFUR)**

| No. | Kind of stock or source— | A.P.I. | Per cent sulfur | Oct. No. | Increase in octane number (A.S.T.M., Motor or 1-C) 1 cc. | 2 cc. | 3 cc. | 4 cc. | Ref. |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Gray and Hutchinson Co., Texas | 60.5 | ... | 48.0 | 6.5 | 12.0 | 16.0 | ... | 1 |
| 2. | Okla. City and W. Kansas | 54.5 | ... | 38.6 | 13.0 | 21.5 | 25.0 | ... | 1 |
| 3. | Oklahoma | ... | ... | 45.2 | 9.1 | 16.2 | 21.9 | 26.1 | 1 |
| 4. | Kansas | ... | ... | 44.7 | 8.3 | 14.4 | 19.0 | 22.1 | 1 |
| 5. | Rodessa, La. | ... | 0.005 | 48.5 | 13.5 | 24.0 | 28.0 | ... | 1 |
| 6. | Bahrein Island, 398 e.p. | ... | 0.03 | 38.5 | 14.0 | 22.5 | 26.0 | ... | 5 |
| 7. | East Texas naphtha | 50.4 | 0.02 | 43.4 | 7.6 | ... | 19.6 | ... | 6 |
| 8. | 440 e.p. | ... | ... | 45.4 | 6.6 | ... | 14.4 | ... | 3 |
| 9. | Heavy | ... | ... | 43.2 | 14.2 | ... | 18.1 | 21.7 | 9 |
| 10. | Full range | ... | ... | 47.8 | 15.9 | ... | 20.2 | 23.1 | 9 |
| 11 | Naphtha | ... | ... | 36.8 | 9.3 | ... | 19.8 | ... | 10 |
| 12. | | ... | ... | 40.0 | 11.7 | ... | 26.9 | ... | 10 |
| | Average | ... | ... | 43.3 | 10.8 | 18.4 | 21.2 | 23.2 | |
| | Smoothed | ... | ... | 43.4 | 10.7 | 16.9 | 21.1 | 24.0 | |
| 13. | Gray and Hutchinson Co., Texas | 67.0 | ... | 59.5 | 9.0 | 14.5 | 18.5 | ... | 1 |
| 14. | Okla. City and W. Kansas | 59.5 | ... | 58.0 | 10.5 | 15.0 | 17.0 | ... | 1 |
| 15. | Pennsylvania | ... | ... | 50.0 | 8.3 | 15.3 | 20.3 | 23.4 | 1 |
| 16. | Panhandle, Texas | ... | ... | 50.0 | 7.8 | 14.0 | 18.3 | 21.6 | 1 |
| 17. | Mid-Continent | ... | 0.026 | 58.5 | 10.0 | 15.0 | 18.3 | 20.9 | 1 |
| 18. | Mid-Continent | ... | 0.003 | 59.5 | 13.9 | 19.0 | 21.1 | 23.0 | 1 |
| 19. | | 64.9 | 0.033 | 53.0 | 10.5 | 16.5 | 20.0 | ... | 1 |
| 20. | Kettleman Hills, Calif., 439 e.p. | ... | 0.025 | 54.0 | 11.0 | 17.0 | 20.0 | ... | 5 |
| 21. | Kettleman Hills, Calif., 350 e.p. | ... | 0.015 | 54.8 | 14.2 | 20.6 | ... | ... | 5 |
| 22. | West Texas—acid treated | ... | 0.044 | 56.7 | 8.2 | 13.5 | ... | ... | 5 |
| 23. | West Texas—acid treated | ... | 0.093 | 50.8 | ... | 14.7 | ... | ... | 5 |
| 24. | West Texas—acid treated | ... | 0.059 | 56.7 | ... | 13.7 | ... | ... | 5 |
| 25. | West Texas—372 e.p. | ... | 0.079 | 54.5 | 10.6 | 16.4 | ... | ... | 5 |
| 26. | West Texas—acid treated | ... | 0.02 | 55.5 | ... | 16.7 | ... | ... | 5 |
| 27. | West Texas—428 e.p. | ... | 0.10 | 51.5 | ... | 12.7 | ... | ... | 5 |
| 28. | West Texas—373 e.p. | ... | 0.10 | 59.2 | 8.1 | 13.4 | ... | ... | 5 |
| 29. | Coastal naphtha | 46.8 | 0.03 | 57.2 | 10.6 | ... | 18.8 | ... | 6 |
| 30. | Turner Valley, Canada | ... | ... | 58.7 | 7.1 | 12.0 | ... | ... | 3 |
| 31. | | ... | ... | 53.7 | 8.0 | ... | 14.8 | ... | 3 |
| 32. | | ... | ... | 59.6 | 5.2 | ... | 9.5 | ... | 7 |
| 33. | Light | ... | ... | 58.5 | 14.5 | ... | 17.6 | 20.3 | 9 |
| 34. | | ... | ... | 58.4 | 5.1 | ... | 14.2 | ... | 9 |
| 35. | Mid-Continent | ... | ... | 54.3 | 13.2 | ... | 22.8 | ... | 10 |
| 36. | | ... | ... | 58.7 | 8.4 | ... | 16.9 | ... | 10 |
| 37. | | ... | ... | 58.5 | 6.9 | ... | 13.7 | ... | 10 |
| 38. | | ... | ... | 52.7 | 7.7 | ... | 16.0 | ... | 10 |
| | Average | ... | ... | 55.9 | 9.5 | 15.3 | 17.5 | ... | |
| | Smoothed | ... | ... | 55.9 | 9.7 | 14.6 | 17.7 | 19.8 | |
| 39. | Caddo Light, La. | ... | ... | ... | 8.2 | 14.0 | ... | ... | 1 |
| 40. | Haynesville, La. | ... | ... | ... | 8.5 | 13.0 | 17.0 | ... | 1 |
| 41. | Gulf Coast | ... | ... | 62.1 | 10.2 | 19.1 | 22.5 | 24.0 | 1 |
| 42. | 65-octane straightrun | ... | ... | 65.0 | 11.0 | 16.0 | 18.0 | 19.5 | 1 |
| 43. | No mercaptan sulfur | 79.3 | | 67.0 | 6.7 | 10.7 | 12.4 | ... | 1 |
| 44. | | 68.7 | 0.018 | 60.5 | 10.0 | 15.0 | 18.0 | ... | 1 |
| 45. | | 62.6 | 0.112 | 63.5 | 8.0 | 11.5 | 14.0 | ... | 1 |
| 46. | | 64.9 | 0.09 | 62.0 | 6.5 | 11.0 | 13.5 | ... | 1 |
| 47. | East Texas | ... | 0.01 | 61.5 | 12.0 | 19.0 | 20.5 | ... | 1 |
| 48. | Kettleman Hills, Calif., 310 e.p. | ... | 0.01 | 67.0 | 10.0 | 15.0 | 17.5 | ... | 5 |
| 49. | Kettleman Hills, Calif., 378 e.p. | ... | 0.016 | 60.0 | ... | 16.0 | ... | ... | 5 |
| 50. | Kettleman Hills, Calif., acid treated | ... | 0.016 | 64.1 | 9.9 | 14.5 | 16.5 | ... | 5 |
| 51. | Kettleman Hills, Calif., acid treated | ... | 0.01 | 63.0 | 11.4 | 15.1 | 17.8 | ... | 5 |
| 52. | So. Calif., 306 e.p. | ... | 0.02 | 69.0 | 10.5 | 15.0 | 17.0 | ... | 5 |
| 53. | So. Calif., 381 e.p. | ... | 0.055 | 61.5 | ... | 14.5 | ... | ... | 5 |
| 54. | So. Calif., 436 e.p. | ... | 0.10 | 62.1 | 8.7 | 13.3 | ... | ... | 5 |
| 55. | So. Calif., 393 e.p. | ... | 0.075 | 65.0 | 8.5 | 12.6 | 14.8 | ... | 5 |
| 56. | So. Calif., acid treated | ... | 0.048 | 65.3 | 9.2 | 12.9 | 14.7 | ... | 5 |
| 57. | So. Calif., acid treated | ... | 0.025 | 65.3 | 10.0 | 13.5 | 16.0 | ... | 5 |
| 58. | So. Calif., acid treated | ... | 0.015 | 65.4 | 10.7 | 14.0 | 16.0 | ... | 5 |
| 59. | Midway, Calif., 436 e.p. | ... | 0.088 | 66.5 | 7.5 | 11.5 | 14.5 | ... | 5 |
| 60. | Inglewood, Calif., 378 e.p. | ... | 0.067 | 67.0 | 9.0 | 13.0 | ... | ... | 5 |
| 61. | Inglewood, Calif., acid treated | ... | 0.026 | 68.0 | 10.0 | 13.0 | ... | ... | 5 |
| 62. | Inglewood, Calif., acid treated | ... | 0.01 | 68.5 | 11.0 | 14.0 | ... | ... | 5 |
| 63. | Santa Maria, Calif. | ... | 0.074 | 60.5 | 9.0 | 13.5 | 16.5 | ... | 5 |
| 64. | W. Texas, acid treated | ... | 0.02 | 60.2 | ... | 15.3 | ... | ... | 5 |
| 65. | New Mexico, caustic washed | ... | ... | 60.6 | 10.4 | ... | 16.9 | ... | 10 |
| 66 | | ... | ... | 61.5 | 5.8 | ... | 10.1 | ... | 10 |
| | Average | ... | ... | 64.0 | 9.3 | 14.1 | 16.2 | ... | |
| | Smoothed | ... | ... | 64.0 | 9.4 | 13.9 | 16.6 | 18.5 | |

*(Continued on Next Page)*


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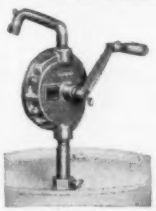

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| No. | Kind of stock or source— | A.P.I. | Per cent sulfur | Oct. No. | Increase in octane number (A.S.T.M., Motor or 1-C) 1 cc. | 2 cc. | 3 cc. | 4 cc. | Ref. |
|---|---|---|---|---|---|---|---|---|---|
| 67. | 70-octane straightrun | | | 70.0 | 10.0 | 14.0 | 16.0 | 17.5 | 1 |
| 68. | 74-octane straightrun | | | 74.0 | 8.0 | 12.0 | 14.5 | 16.0 | 1 |
| 69. | | 64.5 | 0.064 | 70.5 | 8.0 | 11.5 | 13.5 | | 1 |
| 70. | Midway, Calif., 301 e.p. | | 0.019 | 74.5 | 9.0 | 13.0 | 15.0 | | 5 |
| 71. | Midway, Calif., 370 e.p. | | 0.032 | 70.0 | | 13.0 | | | 5 |
| 72. | Midway, Calif., 373 e.p. | | 0.037 | 70.5 | 7.5 | 10.5 | 13.0 | | 5 |
| 73. | Midway, Calif., acid treated | | 0.029 | 70.4 | 8.6 | 12.1 | 13.6 | | 5 |
| 74. | Midway, Calif., acid treated | | 0.018 | 70.5 | 9.0 | 12.5 | 13.5 | | 5 |
| 75. | Inglewood, Calif., acid treated | | 0.095 | 70.5 | 7.0 | 10.0 | | | 5 |
| 76. | Inglewood, Calif., acid treated | | 0.04 | 71.0 | 7.5 | 11.0 | | | 5 |
| 77. | New Mexico, light | | | 76.0 | 9.0 | | 15.2 | | 2 |
| 78. | | | | 71.0 | 4.8 | | 7.6 | | 10 |
| | Average | | | 71.6 | 8.0 | 12.0 | 13.5 | | |
| | Smoothed | | | 71.6 | 8.0 | 11.8 | 13.8 | 15.3 | |

**TABLE 4—LEAD SUSCEPTIBILITY STRAIGHTRUN GASOLINES (HIGH SULFUR)**

| No. | Kind of stock or source— | A.P.I. | Per cent sulfur | Oct. No. | Increase in Oct. No. (A.S.T.M., Motor or 1-C) 1 cc. | 2 cc. | 3 cc. | Ref. |
|---|---|---|---|---|---|---|---|---|
| 1. | West Texas naphtha | 59.2 | 0.21 | 53.2 | 8.1 | | 15.8 | 6 |
| 2. | So. Calif., 436 e.p. | | 0.12 | 55.0 | 9.0 | 14.0 | 17.5 | 5 |
| 3. | Inglewood, Calif., 376 e.p. | | 0.155 | 67.5 | | 10.0 | | 5 |
| 4. | Inglewood, Calif., 435 e.p. | | 0.29 | 62.5 | 6.5 | 10.0 | 12.5 | 5 |
| 5. | West Texas, 375 e.p. | | 0.12 | 54.6 | 8.5 | 12.9 | | 5 |
| 6. | West Texas, 432 e.p. | | 0.25 | 48.5 | | 12.9 | | 5 |
| 7. | West Texas, 372 e.p. | | 0.12 | 54.7 | 9.4 | 13.8 | | 5 |
| 8. | West Texas, 430 e.p. | | 0.28 | 51.5 | | 11.0 | | 5 |
| 9. | West Texas, 374 e.p. | | 0.26 | 60.2 | 7.0 | 11.0 | | 5 |
| 10. | No. 9 acid treated | | 0.13 | 60.9 | | 11.3 | | 5 |
| 11. | West Texas, 423 e.p. | | 0.32 | 55.0 | | 11.2 | | 5 |
| 12. | West Texas, 404 e.p. | | 0.11 | 57.6 | | 12.8 | | 5 |
| 13. | | 79.3 | 0.466 | 65.0 | 5.5 | 8.5 | 10.5 | 1 |
| 14. | | 68.2 | 0.192 | 45.5 | 7.0 | 11.5 | 15.5 | 1 |
| 15. | | 62.6 | 0.112 | 63.5 | 8.0 | 11.5 | 14.0 | 1 |
| 16. | | 59.4 | 0.115 | 43.5 | 8.0 | 13.5 | 17.0 | 1 |
| 17. | Calif., 435 e.p. | 62.5 | 0.29 | 62.5 | 6.5 | 10.0 | 12.5 | 1 |
| 18. | Slaughter, W. Tex., 375 e.p. | | 0.28 | 55.0 | 6.0 | (9.7) | 13.5 | 4 |
| 19. | Slaughter, W. Tex., 385 e.p. | | 0.234 | 56.1 | (6.1) | (9.8) | 11.1 | 4 |
| 20. | West Texas, 444 e.p. | | 0.19 | 50.5 | 6.5 | 11.0 | 14.5 | 4 |
| 21. | Natural gasoline, 340 e.p. | | 0.26 | 51.4 | 6.1 | 9.8 | (12.3) | 4 |
| 22. | West Texas | | | 56.5 | 7.1 | | 13.5 | 3 |
| | Average | | | 55.9 | 7.2 | 11.3 | 13.9 | |
| | Smoothed | | | 55.9 | 7.5 | 11.3 | 13.7 | |

() Parenthesis indicates estimated figures.

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**William M. Keppel,** Rochester, N. Y., district sales manager for Colonial Beacon Oil Co. since 1941, has been appointed northern public relations representative of Standard Oil Co. of New Jersey. His territory will include the refineries at Bayonne and Bayway, N. J.; Everett, Mass., and Baltimore, besides the sales divisions of a group of eastern states.

**J. R. Mulvey,** assistant comptroller of Humble Oil & Refining Co., has been elected president of the Houston Control of Controllers Institute of America. **W. D. Winston,** secretary Lufkin Foundry & Machinery Co., was named first vice president. New directors are: **Harry B. Drennan,** Superior Oil Co.; **S. G. Loy,** assistant controller Humble Pipe Line Co., and **W. M. Padgett,** assistant secretary Pan American Pipe Line Co.

**J. N. Greene,** president, Alabama Gas Co., has been elected a director of American Gas Association, to fill a vacancy until November 1, caused by the resignation of **H. Carl Wolf,** who became managing director of the association on October 1. **Henry Fink,** general manager, Michigan Consolidated Gas Co., was elected a director to fill the unexpired term of the late John W. Batten.

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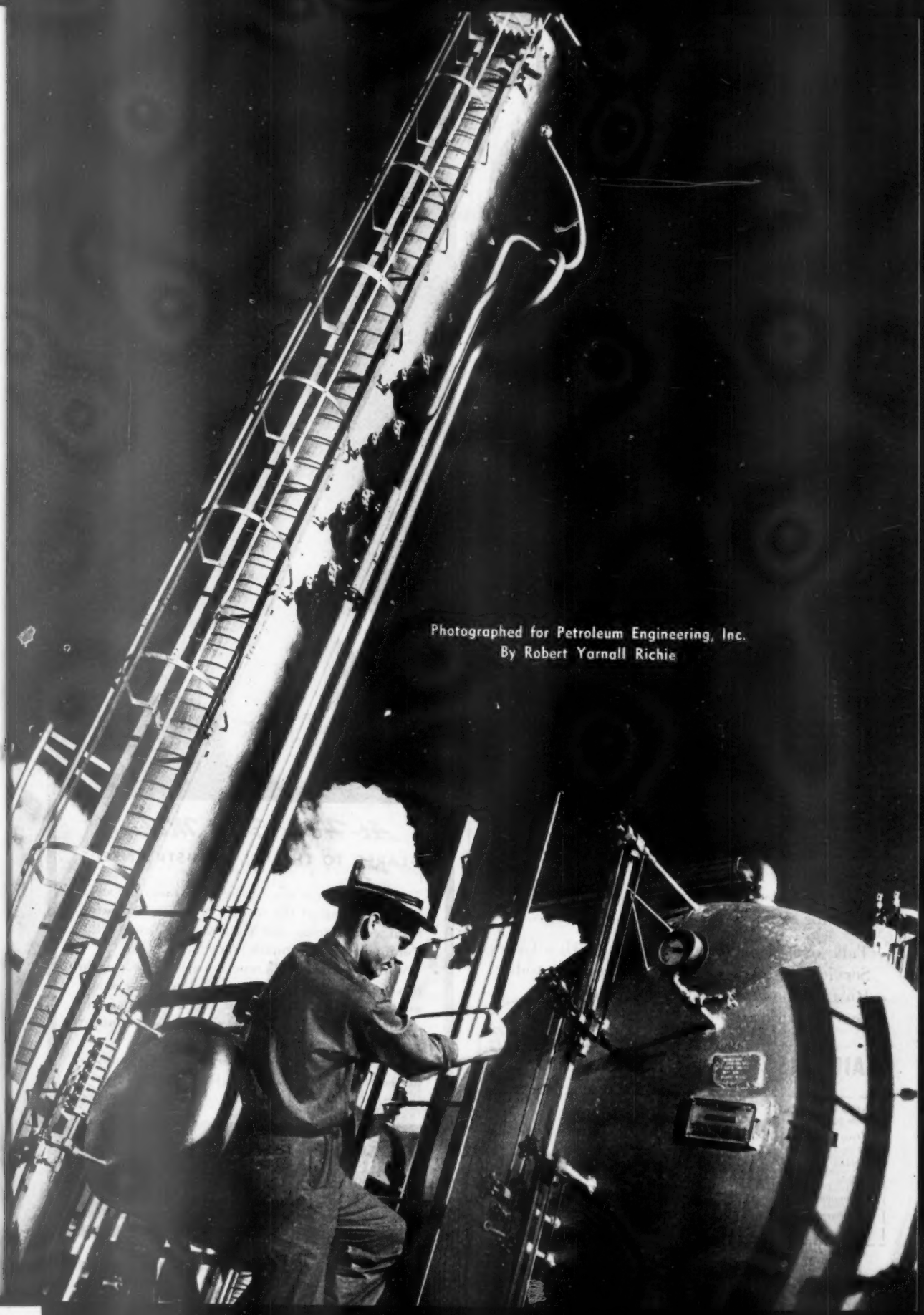

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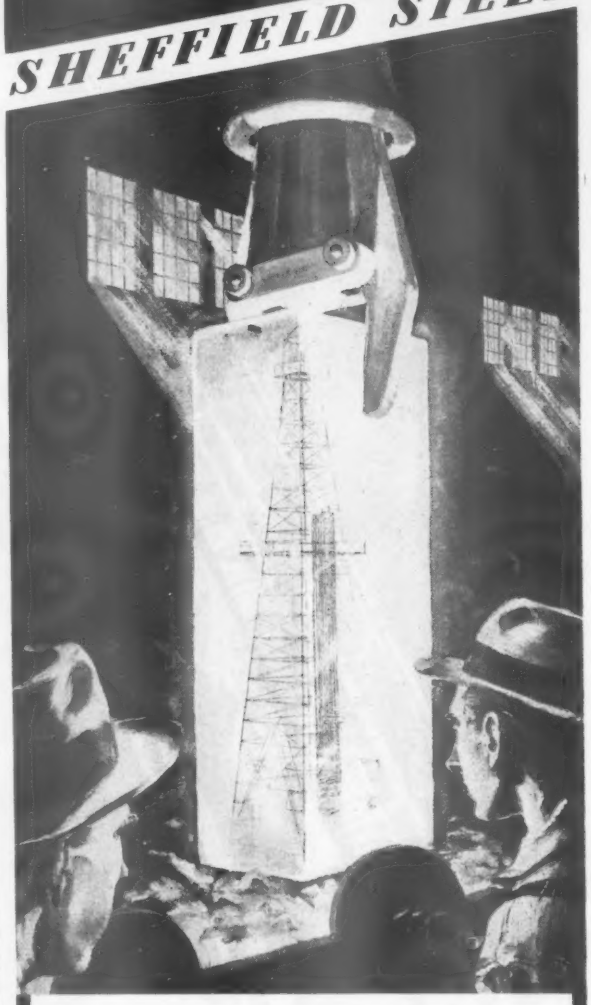

## *At-Home Steel Making*

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# Elimination of Air From Process Water In Generation of Acetylene

**by J. D. Constance**

A TRACE of oxygen is a very important impurity in acetylene which is used in certain syntheses, but a small quantity of oxygen is known to be very deleterious in the preparation of vinylacetylene, and, besides creating an explosive mixture, has effects in the polymerization, halogenation, and hydration of acetylene. It is, therefore, of paramount importance to maintain the oxygen content of the acetylene generated from calcium carbide down to very low percentages by volume when supplying this gas for the basic synthesis of neoprene and certain other artificial rubbers.

In the wet process for the generation of acetylene, calcium carbide either in dust or lump form is allowed to drop into and through a tank about three-quarters filled with water and the acetylene generated follows the reaction:

$$CaC_2 + H_2O \rightarrow C_2H_2 + Ca(OH)_2 + 54{,}900 \text{ B.t.u. per lb. Mol}$$

The reaction is exothermal and requires the addition of water not only to carry on the reaction but also to maintain the temperature of the water in the tank in the neighborhood of 170° F.

It is possible for air to enter the generator tank through this water stream, and all precautions should be taken to eliminate any entrained air bubbles which may be carried in this way. The use of process water obtained from deep wells is an economical method and has attained extreme popularity in this country. However, certain pitfalls are inherent.

When tremendous volumes of water are withdrawn from underground water aquifers in localities with high concentrations of industrial activity the ground-water level drops rapidly unless the supply is replenished. Vertical deep wells feel the effect sooner than those wells which withdraw underground water through screened pipes horizontally extended at depths well below the ground-water level. The screened sections of the vertical wells become starved of water and air is sucked into the water stream Unless steps are taken to separate the entrained air from the water used for the generation of acetylene, poor production as mentioned above will result.

One method of coping with the problem of entrained air has been successfully applied. The approach is not new to the process industries, but the dividends enjoyed are very evident. When low ground-water levels endangered production and the quality of the acetylene produced by the wet generation method, a plant applied the method described here after the installation of air vent valves at the deep well pumps failed to eliminate all of the entrained air. The development of a new and different source of trouble cleared the path for the solution to the problem of air entrainment, and the final design enhanced both production and maintenance phases of plant management.

At about the same time that the low-water condition prevailed, the gas compressors, which were of the water-sealed rotary type, began to stall and cutout of stream. Upon tearing down one of the compressors large quantities of sand were removed from the housing. This restored the motor to its former high performance, but showed that sand from the deep wells was finding its way through the pipe line to the pumps. All of the compressors responded to the same treatment.

By providing an enlarged section in the discharge header tying in all of the deep wells the relative reduction in velocity would afford an opportunity for the air and sand in the water stream to separate. Fig. 1 shows the hookup which has worked.

The air elimination and settling tank, Fig. 1, installed in the water-supply header, is 15 ft. long and 5 ft. in diameter. With a flow of 1,000 g.p.m. of well water these dimensions allow the water velocity entering at 6.35 ft. per second to drop to a velocity of approximately 0.112 ft. per second, thus allowing the sand to settle to the bottom and entrained air to accumulate at the top. Actual operating experience shows that the tank should be vented once every week. The inlet and outlet nozzles were placed high enough to prevent the water stream from scouring the bottom of the tank and thus permitting the sand to be carried on through the system. Their setting also was far enough below the top of the tank to prevent any sweeping of the air into the outlet nozzle.

Once every 2 months the tank is bypassed and the accumulated sand removed. The operating pressure is maintained at 100 psig.

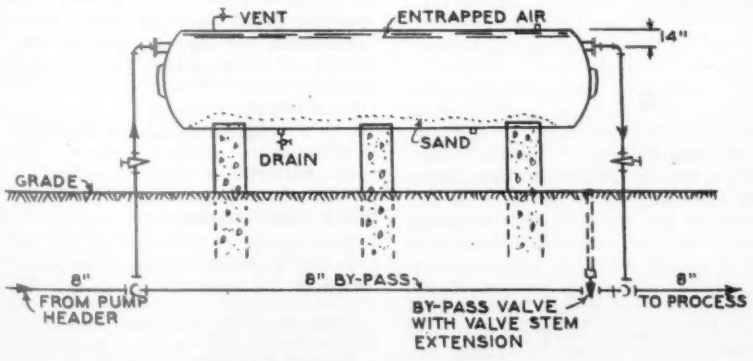



*Fig. 1—Air elimination and settling tank*

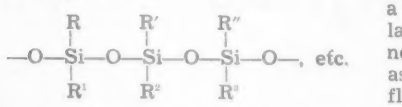
## Buckendale Heads SAE Technical Board of 23

NEW YORK.—L. R. Buckendale, engineering vice president of The Timken-Detroit Axle Co., is chairman of a technical board of 23 high-ranking engineers appointed to coordinate all technical committee activities of Society of Automotive Engineers. The board, J. M. Crawford, SAE president, said, has already begun the work of converting the society's war engineering program to peacetime service of industry and of government. D. P. Barnard, associate research director Standard Oil Co. (Indiana), and G. W. Laurie, automotive transportation manager, The Atlantic Refining Co., are members of the new board.

# The Silicones

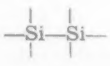
*(Continued from page 88)*

which are silicane with one or two unattached valences, by means of oxygen atoms. The general configuration becomes:



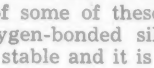
In this type molecule R, R′, R¹, etc., are organic radicals such as methyl, $H_3C$—, amyl, $C_5H_{11}$—, etc.

Rochow,* discussing these products in some detail, states that the nonoxygen materials are named for the hydrides which are also called silanes. That is, $C_2H_5$—Si—$H_3$ is called, also, ethyl silane. A compound containing the grouping



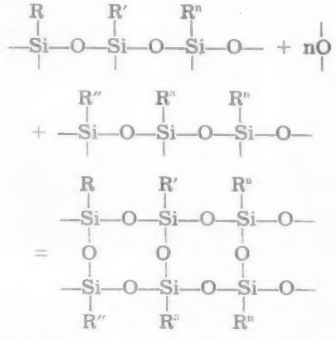
is called a disilane, its exact name being determined by the kind of substituent groups included in the molecule. These products are remarkably stable, although the hydrides, resembling hydrocarbons in structure and in many properties, are hydrolyzed completely by water solutions of alkali, and undergo spontaneous combustion in contact with atmospheric oxygen. The organo-silanes, or substituted silicanes, lose this reactivity of the parent substances Si $(CH_3)_4$, silicon tetramethyl boils undecomposed at normal atmospheric temperatures (79° F.), and is unaffected by the strongest acids. Triethyl silicon hydride, H—Si—$(C_2H_5)_3$, is a liquid boiling at 107° C. (225° F.), decidedly stable. Silicon (or silicane) tetraphenyl, $Si(C_6H_5)_4$, is a crystalline solid boiling "undecomposed at red heat," giving a clear idea of the extreme stability of some of these products.

The oxygen-bonded silicones are relatively stable and it is with these materials that we are most concerned. These are referred to as organo-silicon oxides, or organo-siloxanes, based on the type group



with organic radicals attached to one or both of the Si valence bonds shown uncombined. With two such groups we have a disiloxane, its specific name being determined by the organic groups attached, such as methyl-propyl disiloxane for a molecule containing one methyl and one propyl group combined with silicon directly. The siloxane groups polymerize to form products varying from moderately volatile liquids to high-melting resinous solids. Silicon is in the second period, Series 3, Group IV of the Periodic Table, adjacent in the group to carbon and Rochow explains the polymerization tendency of siloxanes by noting the fact that silicon, while normally tetravalent has a position to give it a maximum of six valences, and "is large enough to accommodate six neighbors of high nuclear charge . . . as it does in the $SiF_6$— ion," the fluosilicic acid radical.

It is agreed that the polymerization takes place by means of oxygen linking atoms, according to the following general scheme:



In this scheme "n" represents any number of bonding oxygen atoms from one up; $R^n$ represents any organic radical of one or more than one carbon atom.

As to methods of preparation of the silicone monomers, several processes are available. The oldest and most common is the Grignard reaction, wherein a Grignard reagent reacts with silicon tetrachloride:

$$2CH_3MgBr + SiCl_4 = (CH_3)_2SiCl_2 + 2MgBrCl$$

The dimethylsilicon dichloride may be hydrolyzed to form the silicol or diol, substituting two —OH radicals for the chlorine atoms attached to silicon, $(CH_3)_2Si(OH)_2$. This is very unstable and decomposes rapidly by liberation of a molecule of water to form the silicone:

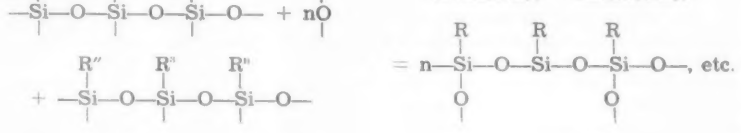
$$(CH_3)_2Si(OH)_2 \rightarrow (CH_3)_2SiO + H_2O$$

silicone monomer

This monomer immediately polymerizes to form the various products as mentioned. Some of the lower-molecular-weight silicon monomers are so reactive in polymerizing that they have never been isolated in the form of the monomer unit. This synthesis is that developed by Kipping and his collaborators. Another method is by combining $SiCl_4$ with olefins, an olefin molecule breaking its double bond and joining carbon direct to silicon, the displaced Cl atom attaching to the complementary carbon bond. Obviously by this method the methyl group cannot be added directly to the molecule.

Interlinking or crosslinking of silicone chains to form liquid or resinous bodies is accomplished by substituting one of the four Cl atoms in $SiCl_4$ by an alkyl or other organic group, and hydrolyzing the product, eliminating the other 3 Cl atoms and forming R—$Si(OH)_3$. This triol decomposes and condenses with a similarly hydrolyzing-decomposing diol to form the crosslinking complex, introducing individual Si atoms to which are attached at least temporarily two oxygen atoms:

$$nRSi(OH)_3 + nR_2Si(OH)_2$$



$$+ mH_2O$$

Still another method is employed for preparation of polymers, especially for making heat-curing resinous polymers.* A disubstituted silicon chloride is hydrolyzed and this product heated in the presence of atmospheric oxygen at 300° C. (572° F.). This forms a heat-curing silicone resin.

The family of silicone polymers shows the widest range of variation in properties.† Some products are liquids and are used where liquids are needed for various purposes. Some of these "oils" show pour points as low as —85° C., making them highly desirable in locations where fluidity at extremely low temperatures is required. These may be utilized at temperatures as high as 300° F. without sludge formation or discoverable oxidation. The silicones of the elastomer type may be used to make a silicone rubber which hardens only a temperatures below —55° C. (—67° F.). The "bouncing putty" which has so surprised scientists and laymen alike is one of the methyl silicone polymers, possessing the remarkable property of strongly resisting quickly applied distortional forces and showing great elasticity under these conditions, yet may be molded like dough or putty when the force is applied slowly. This material flows like a highly viscous liquid, under its own weight or under a pressure continuously applied; when the same material is thrown against a solid surface it bounces like a high-grade "live" rubber.

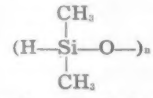
The degree of crosslinkage in the polymer molecule controls in great measure the variation in properties

*Rochow, "The Organo-Silicon Polymers," Chem. Eng. News, Vol. 23, No. 7, Apr. 10, 1945, p. 612.

*Long & Hyde, Jr., Am. Chem. Soc., Vol. 63, p. 1194 (1941).

†Rochow & Gilliam, J. Am. Chem. Soc., Vol. 63, p. 798 (1941).

of the product. With a product having silicon atoms and methyl groups in the ratio of 5 to 6, it is reported, the polymer of methyl silicone (methyl siloxane) solidifies in 2 hours at 212° F., shows 1.425 refractive index and 1.2 density (specific gravity). By the same polymerization process a methyl silicone having silicon to methyl groups in the ratio of 3 to 2, heating at 212° F. for 24 hours yielded a solid polymer of 1.418 refractive index and specific gravity of 1.06. Rochow points out that since dimethyl silicone,



has 1.406 refractive index and 0.977 specific gravity, while fused quartz ($SiO_2$, silicon dioxide) shows 1.458 refractive index and 2.21 specific gravity, the substituted silicones will show properties in this respect intermediate between these limits.

The resistivity of methyl silicones to oxidation decomposition by heat is determined by the degree of resistance of the methyl group to attack by oxygen. Some of the methyl silicone resins have shown no decomposition at 200° C. in air when heated for several years. If oxygen is excluded from contact with the heated resin the decomposition temperature and therefore the maximum working temperature is raised considerably.

Additional articles in recent literature on silicones are as follows:


1. Silicones — High Polymeric Substances, Modern Plastics, Nov. 1944, p. 124.
2. Organic Derivatives of Silicon—Kipping, Proc. Chem. Soc. (London), Vol. 20, p. 15 (1904); 1927, p. 104.
3. Rochow, U. S. Pats. 2,258,219, 2,258,220, and 2,258,221, Oct. 7, 1941; 2,352,974, July 4, 1944.
4. Rochow, U. S. Pats. 2,258,222, Oct. 7, 1941; 2,286,763, June 6, 1942.
5. Gilliam, Liebhafsky and Winslow, J. Am. Chem. Soc., Vol. 63, p. 801 (1941).
6. Kipping, J. Chem. Soc. (London), Vol. 91, p. 209 (1907).
7. British Pats. 548,911, 548,912, Oct. 29, 1942, hydrolyze aryl silicone dihalide and dehydrate, to form ingregnating varish.
8. British Pat. 551,649, Mar. 4, 1943, hydrolyze mixtures of ethyl silicon halides with 0.5 to 1.5 ethyl radicals per Si atom in the molecule, and dehydrate to make an electrical insulating varnish.


## Unusual Design Features Gas Line

*(Continued from page 94)*

from the United gasoline plant to a connection with the company's 22-in. Waskom - Goodrich line, a distance of approximately 4 miles. The latter line, which passes through the field, has been in existence many years. Through the new connection, additional volumes of Carthage gas will be made available to augment the supply of gas to the company's South Louisiana and South Texas systems.

The new Carthage-Monroe 24-in. line is designed to operate at an inlet pressure of 1,000 psi. and outlet pressure of 500 psi. At these pressures it will have a capacity of approximately 310,000,000 cu. ft. daily. By the installation of an 8,000-hp. compressor station, the capacity could be increased to 395,000,000 cu. ft.

For the time being, no compressor nor booster stations will be needed. Well flowing pressures in the field run from 2,000 to 2,700 psi., allowing operation of absorbers at the gasoline plant at sufficient pressure to insure delivery of residue gas to the line at its designed intake pressure.

Of particular interest is the use of pipe of different wall thicknesses and weights. Exclusive of stream crossings, the line will be made up of pipe having seven different wall thicknesses and weights. These will range from 125.49 lb. per foot and ½-in. walls down to 63.41 lb. per foot and ¼-in. walls. In this, the weight and wall thickness of the pipe are specially adapted to the pressure and other conditions of the section in which the pipe is laid. Thus, in general, the line is telescoped downward in weight and wall thickness in successive sections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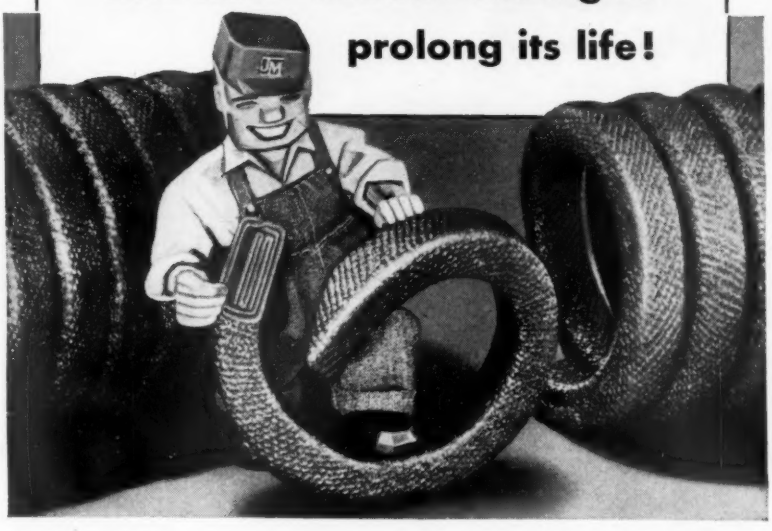

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or stages from the inlet end as pressure declines in these sections permit the use of lighter pipe. This provides a streamlining of wall thicknesses and weights that is resulting in important economies in pipe costs.

The different wall thicknesses and weights of pipe and the sections on which each is being laid are indicated on the accompanying map. A. O. Smith welded pipe is being laid throughout. As shown, use of the heaviest pipe (½-in. wall, 125.49-lb. per foot) is confined to four short stretches. These are in low, flooded spots where the extra weight is needed to facilitate holding the line in place. The longest of these is approximately 4½ miles through the D'Arbonne flats between D'Arbonne Bayou and the Ouachita River. This is the most difficult section for laying pipe of any place on the entire line.

At the Carthage end, where the inlet gas pressure will be 1,000 psi., 13/32-in. wall, 102.37-lb. pipe is laid. This same weight pipe also will be used for the Red River crossing, totaling approximately 3,250 ft., which comes within the section using 11/32-in. wall, 86.85-lb. pipe. The line will be finished with ¼-in. wall, 63.41-lb. pipe, at which end the pressure will have been reduced to approximately 500 psi.

All stream crossings, excepting the Red River, where a suspension bridge is being constructed, will be multiple lines. These crossings and the pipe to be used are as follows:

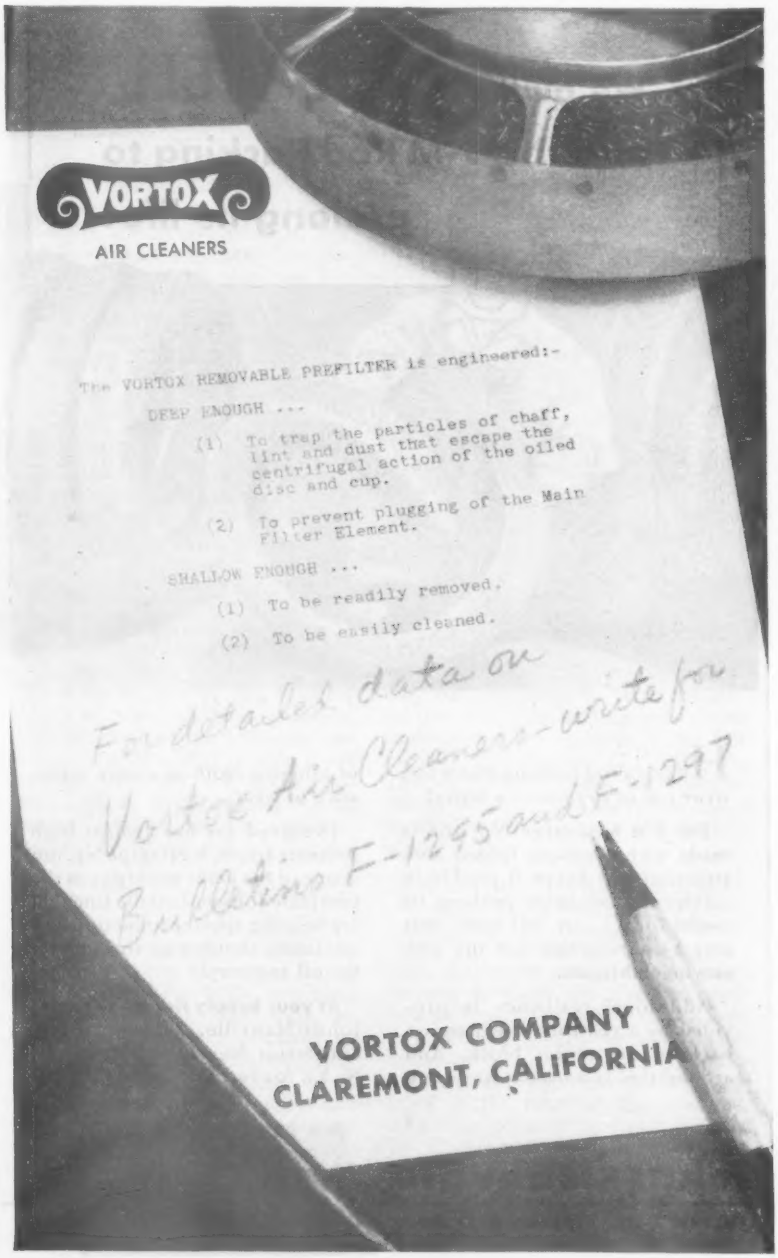
| Crossing— | Length (ft.) | Number lines | Pipe size (in. o.d.) | Wall thickness (in.) | Pipe weight (lb./ft.) |
|---|---|---|---|---|---|
| Sabine River | 8,300 | 2 | 20 | ½ | 104.13 |
| Bayou Pierre | 506 | 3 | 16 | ½ | 82.77 |
| Loggy Bayou | 430 | 3 | 16 | ½ | 82.77 |
| D'Arbonne Bayou | 850 | 3 | 16 | ½ | 82.77 |
| Ouachita River | 2,000 | 5 | 14 | ½ | 72.09 |

A suspension bridge is being provided for the Red River crossing because of the treacherous quicksand bottom and shifting channel of the river at that point. The bridge, one of the largest of its kind ever built, will have a main span of 1,600 ft. with an 800-ft. approach span at each end. Since the river is classified as a navigable stream, the bridge, at the bottom of the pipe, will have a clearance of 56 ft. above maximum high-water level. Height at the top of the main span will be approximately 165 ft. above maximum high-water level. It will carry the single 24-in. line, and will cost between $400,000 and $500,000.

*Stearns Electronic Holiday Detector (jeep) following coating and wrapping machine*

Right-of-way for the line is 50 ft. wide. Most of it is through fairly good terrain for pipe laying, although much is rolling country and timbered. There are only a few scattered low swampy stretches. Involved in obtaining the right-of-way were 450 property owners. It was obtained with a minimum of difficulty although as many as 16 signatures were required in some cases.

Preparatory to stringing and lay-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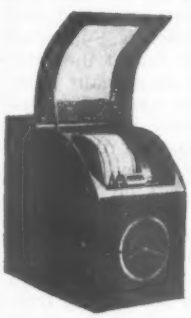

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ing the line the right-of-way is cleared and graded the entire width with all stumps and other obstructions removed. Power saws are being used on some stretches although much of the timber is being cut by manual labor. All timber down to pulp wood is being salvaged. The ditch line is 15 ft. from the north side leaving 35 ft. on one side for working space. With the ditch at one side, it also will be possible to lay a second line at some later date, if desired, without additional right-of-way.

Ditch is being cut 54 in. deep and 37 in. wide. Two large ditching machines are being employed on each spread to insure keeping ahead of laying crews. Each machine pulls a bottom drag and top scraper to provide a clean and uniform ditch. The 54-in. cut allows the pipe to be covered a minimum of 30 in.

Pipe is strung about 7 to 7½ ft. from the ditch line where the joints are lined up and stovepipe welded into sections of from 2,000 to 2,500 ft. Lining up and welding crews are preceded by the bending crew employing a C-R-C pipe-bending machine. This machine is equipped with two shoes, one for smooth bends and the other for wrinkle bends. The former bends are made on the heavier pipe while wrinkle bends are made on the lighter pipe. All bends are made cold.

Lining and welding are done on skids elevated by cribbing to a convenient working height for the welders and for the traveling cleaning-and-priming and coating-and-wrapping machines to follow. Three, and sometimes four Caterpillar tractors are operated by each crew in picking up and lining up the pipe. The successive joints are lined up and held in position for tack welding with conventional Tipton external clamps.

Electric welding is practiced and about six beads are usually made to complete each weld. Normally 7 to 10 position welders are required on each section to keep up with the line-up crews and tack welders. On one spread there are 19 welding machines, although not all are kept busy at all times, since some are held in reserve as standbys and for emergency use.

As each section of 2,000 to 2,500 ft. is welded it is cleaned and primed and coated and wrapped with the traveling machines. Coating and wrapping are applied to a thickness of ⅛ in. Both Bitumastic enamel and Somastic are being used. The latter is being applied mainly on certain stream crossings and through low, swampy stretches subject to flooding. Most of the line is being wrapped with asbestos felt, although on some stretches in the eastern spread Fibreglas is being used, this being wrapped with kraft paper.

The coating-and-wrapping machine is followed by a Stearns Electronic Holiday Detector. Any holidays indicated or other flaws found in the coating are marked and then repaired manually. A minimum number of holidays or other flaws has been found in the work so far.

Completed sections are lifted over the ditch by four tractors. Supported on skids across the top of the ditch they are allowed to remain overnight for maximum contraction, and are bell-hole welded into the line only during the cool of the morning. Through fairly level country sufficient pipe is left on the loose ends to permit a slack loop about every 1,000 ft. Welded ends of the sections then are handcoated and wrapped and the sections lowered into the ditch. Two back-filling tractors ordinarily are kept busy on each section to keep up with the line.

Insulating flanges are placed at all valves to isolate the line electrically between valves.

Cathodic protection is not being provided for the line at this time. Company engineers are of the opinion that the precautions being taken to insure a perfect coating protection and provisions made for isolating sections of the line electrically will prove amply effective.

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# The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

# Number of Fractionating Trays

WHEN working with the complex mixtures of the petroleum industry, the fractionation or degree of separation can be measured most easily by means of the gap or overlap of the distillation ranges of the products. Using A.S.T.M. distillation temperatures, it is common practice to compare the gap (or overlap) of the temperature at the 95 per cent point of the low-boiling product with the 5 per cent temperature of the high-boiling product, as shown in Tables 1 and 2. The initial boiling point of the high-boiling product and the end point of the low-boiling product are sometimes compared for gap or overlap but the accuracy (and significance) of these temperatures is not good. The tables apply only to reflux ratios of 1 to 5 and to plates between 4 and 10, nor can the data given in them be safely extrapolated to handle narrow-boiling-range solvents or naphthas. The data given in the tables were taken almost totally from "Distillation Equipment in the Oil Refining Industry" by J. W. Packie of Standard Oil Development Co. (Trans. A.I.Ch.E. XXXVII, pg. 51, 1941).

**TABLE 1—SEPARATION BETWEEN TOP PRODUCT AND HIGHEST SIDESTREAM PRODUCT IN CONVENTIONAL PETROLEUM FRACTIONATING TOWERS (PACKIE)**

(Numbers in parentheses apply if the sidestream product is stripped with steam)

| No. of plates | Reflux ratio | Gap or overlap* between A.S.T.M. 5% and 95% points, (°F.) For 100° cuts | For 150° cuts | For 200° cuts | For 250° cuts |
|---|---|---|---|---|---|
| 4 | 1 | ..... | ..... | ..... | ..... |
| | 2 | **—55 (—30)** | **—19 (2)** | 10 (30) | 33 (47) |
| | 3 | **—30 (—11)** | 0 (16) | 27 (41) | 47 (59) |
| | 4 | **—16 (—2)** | 11 (24) | 37 (49) | 56 (66) |
| | 5 | **—8** (4) | 18 (30) | 42 (53) | 62 (71) |
| 6 | 1 | ..... | **—33 (—11)** | **—6** (15) | 17 (36) |
| | 2 | **—30 (—11)** | 0 (16) | 27 (41) | 47 (59) |
| | 3 | **—10** (2) | 15 (28) | 40 (51) | 60 (69) |
| | 4 | **—2** (10) | 22 (33) | 46 (56) | 64 (73) |
| | 5 | 3 (13) | 27 (37) | 50 (59) | 68 (76) |
| 8 | 1 | **—55 (—30)** | **—19** (2) | 10 (30) | 33 (47) |
| | 2 | **—16 (—2)** | 11 (24) | 37 (49) | 56 (66) |
| | 3 | **—2** (10) | 22 (33) | 46 (56) | 64 (73) |
| | 4 | 4 (14) | 28 (37) | 50 (60) | 69 (77) |
| | 5 | 8 (18) | 31 (40) | 52 (62) | 70 (78) |
| 10 | 1 | **—40 (—19)** | **—8** (10) | 21 (37) | 42 (55) |
| | 2 | **—8** (4) | 18 (30) | 42 (53) | 62 (71) |
| | 3 | 3 (13) | 27 (37) | 50 (59) | 68 (76) |
| | 4 | 8 (18) | 31 (40) | 52 (62) | 70 (78) |
| | 5 | 11 (20) | 33 (41) | 54 (63) | 72 (80) |

*Bold-face figures (also negative sign) indicate overlap of the 5 per cent and 95 per cent points, whereas flame figures indicate a gap.

**Gap or overlap.**—A.S.T.M. 95 per cent temperature of low-boiling product less the 5 per cent temperature of the high-boiling product. A negative difference indicates overlapping (poor fractionation) and overlaps are shown in bold-face type in the tables.

**Steam stripping.**—Gaps and overlaps when stripping steam is used are shown in parenthesis in tables.

**Number of plates.**—This means actual plates.

**Reflux ratio.**—Defined as the hot (or internal) reflux (see Refiner's Notebook No. 46, June 16) at the light-product tray divided by the sum of all products lighter than the heavy product—all quantities taken as liquid volumes at 60° F.

**Width of cut.**—This is defined as the difference between the A.S.T.M. 50 per cent temperatures of the two products. When the difference is taken from the true-boiling point curve of the charge stock, the gap that is obtained is about 5° F. greater than shown in the tables.

**TABLE 2—SEPARATION BETWEEN TWO SIDESTREAM PRODUCTS IN CONVENTIONAL PETROLEUM FRACTIONATING TOWERS (PACKIE)**

(Numbers in parentheses apply if both products are stripped with steam.)

| No. of plates | Reflux ratio | Gap or overlap* between A.S.T.M. 5% and 95% points, (°F.) For 100° cuts | For 150° cuts | For 200° cuts | For 250° cuts | For 300° cuts | For 350° cuts |
|---|---|---|---|---|---|---|---|
| 4 | 1 | — **(—33)** | **—46 (—21)** | **—32 (—9)** | **—21 (—2)** | **—10** (9) | 3 |
| | 2 | **—42 (—20)** | **—29 (—5)** | **—17** (6) | **—3** (15) | 10 (27) | 21 |
| | 3 | **—30 (—9)** | **—13** (6) | **—1** (19) | 13 (30) | 26 (40) | 38 |
| | 4 | **—17 (—2)** | **—3** (12) | 11 (26) | 24 (38) | 37 (49) | 49 |
| | 5 | **—10** (1) | 3 (16) | 18 (30) | 30 (42) | 42 (51) | 54 |
| 6 | 1 | **—47 (—27)** | **—36 (—12)** | **—24 (—1)** | **—12** (8) | 0 (18) | 12 |
| | 2 | **—30 (—9)** | **—13** (6) | **—1** (19) | 13 (30) | 26 (40) | 38 |
| | 3 | **—12** (0) | 1 (15) | 16 (29) | 29 (40) | 40 (51) | 52 |
| | 4 | **—5** (5) | 8 (19) | 22 (32) | 36 (45) | 46 (55) | 58 |
| | 5 | 0 (8) | 12 (21) | 27 (36) | 40 (49) | 50 (59) | 62 |
| 8 | 1 | **—41 (—20)** | **—29 (—5)** | **—17** (6) | **—3** (15) | 10 (27) | 21 |
| | 2 | **—17 (—2)** | **—3** (12) | 11 (26) | 24 (38) | 37 (49) | 49 |
| | 3 | **—5** (5) | 8 (19) | 22 (32) | 36 (45) | 46 (55) | 58 |
| | 4 | 1 (10) | 13 (22) | 28 (37) | 41 (50) | 52 (60) | 64 |
| | 5 | 3 (11) | 16 (23) | 30 (38) | 43 (51) | 54 (62) | 66 |
| 10 | 1 | **—34 (—14)** | **—21** (0) | **—10** (12) | 4 (22) | 18 (33) | 30 |
| | 2 | **—10** (1) | 3 (16) | 18 (30) | 30 (42) | 42 (51) | 54 |
| | 3 | 0 (8) | 12 (21) | 27 (36) | 40 (49) | 50 (59) | 62 |
| | 4 | 3 (11) | 16 (23) | 30 (38) | 42 (51) | 54 (62) | 66 |

*Bold-face type (also negative sign) indicates overlap of the 5 per cent and 95 per cent points whereas regular type indicates a gap.

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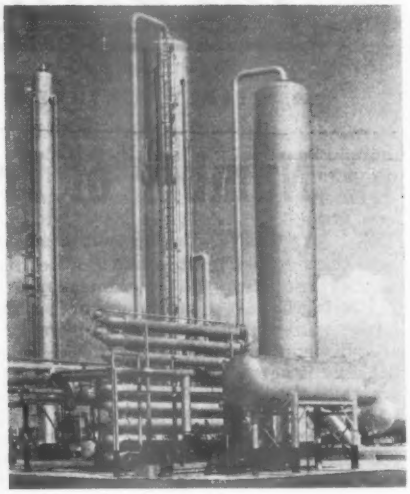

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**THE OIL AND GAS JOURNAL**
**Tulsa 1, Oklahoma**

# Methods of Tracing Migration of Gas in Repressuring And Recycling Operations

THE use of gas tracers in repressuring and gas-recycling operations is helpful in studying gas migration, in detecting where bypassing and fingering of the injected gas are taking place, and, in fields having more than one porous layer, for determining which sand is receiving most of the injected gas. The method consists of adding a known amount of detectable gas, called tracer, to the injection gas. The tracer gas, in most cases, is added to the low-stage intake of the compressor; then, by determining by analysis the amount of this tracer gas which is produced in surrounding wells, it is possible to calculate the amount of injected gas being produced from each well affected by the injection operations.

In most cases, inert gases are used as tracers. The following tracers have been tried out or suggested: carbon monoxide, ethyl mercaptan (detectable by its strong odor), nitrogen, helium, carbon dioxide, and exhaust gas from combustion engines containing carbon dioxide and carbon monoxide. Simons[1] used successfully carbon monoxide manufactured by heating carbon dioxide and carbon for tracing gas flow through subsurface sands in the Louden, Illinois, field. The amount of carbon monoxide gas used was 500 p.p.m. injected into the input well at a pressure of 900 psi. The amount of this tracer gas found in eight producing wells surrounding the injection well varied from 3 to 175 p.p.m. The gas from the producing wells was analyzed daily and the volume of the tracer computed carefully. The results showed not only the time required for the gas to reach the producing wells but also the relative permeability of the sand to gas flow between the injection well and producing wells. Other engineers have suggested the use of helium or nitrogen and the determination of the inert gas by a mass spectrometer. The mass spectrometer is a very rapid and accurate instrument for determining the tracer, but is expensive and requires a well-trained physicist to operate. Spent gas from combustion engines is probably preferable to the carbon monoxide gas where large repressuring or recycling operations are to be dealt with because carbon monoxide gas is more expensive. According to Simons,[1] carbon monoxide costs about 6 cents per cubic foot in the Louden field.

**Gas analysis method.** — Van Wingen and Valby[2] developed a very ingenious method of tracing input gas through a field by chemical analyses of the gas. They found, for example, that the gas in the oil and the gas in the gas cap contained different weight fractions of the common hydrocarbons found in gas as shown by Table 1.

**TABLE 1**

**Comparison of Hydrocarbon Analysis of Gas From Dark Oil and Gas From Gas Cap**

| | Gas from oil | Gas from oil cap |
|---|---|---|
| Methane | 0.1034 | 0.4791 |
| Ethane | 0.0230 | 0.0813 |
| Propane | 0.0249 | 0.0745 |
| Butane | 0.0265 | 0.0547 |
| Pentane | 0.0239 | 0.0437 |
| Hexane | 0.0355 | 0.0426 |
| Heptane | 0.7628 | 0.2241 |
| Propane | 0.1513 | 0.6349 |
| Butane | 0.8487 | 0.3651 |

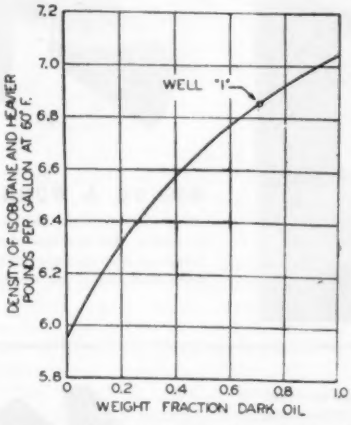


*Fig. 1—Weight fraction of dark oil in well effluent from density of isobutane and heavier. Reproduced from a diagram by N. Van Wingen and E. P. Valby*

The cubic feet of propane and lighter gas per 100-lb. weight of gas was 394 for the gas from the oil and 1,297 for the gas from the gas cap. These data enabled Van Wingen and Valby[2] to establish equations and construct graphs showing the relationship of the density of the isobutane and heavier gases to the amount of dark oil in the producing well for the field. They calculated also the relationship between isobutane and heavier gas content in a well producing both gas from the oil and gas from the cap. These graphs are illustrated in Figs. 1 and 2. In the same way, by analysis the relationship between the constituents of any injected gas and gas in a producing well can be worked out and the proportion of gas from each source obtained by means of a graph. This method has the advantage of saving the injection of an inert gas, but required a very elaborate gas-analysis equipment, laboratory, and well-trained and expert chemists. So far all methods devised for tracing gas are highly technical and expensive.

## References

1. Simons, Harry F., Tracer Gas Used to Check Repressuring Progress, The Oil and Gas Journal, p. 36, Nov. 19, 1942.
2. Van Wingen, N., and Valby, E. P., Control and Detection of Reservoir Movement in Pressure Control Operation, The Oil and Gas Journal, Dec. 2, 1944.

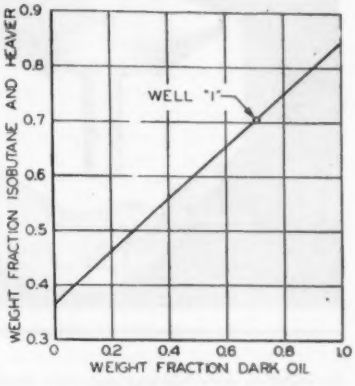


*Fig. 2—Weight fraction of dark oil in well effluent from weight fraction of isobutane and heavier. Reproduced from a diagram by N. Van Wingen and E. P. Valby*

**Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas**

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## CHECKING THE VALVE SEAT FOR BUSHING WEAR . . .

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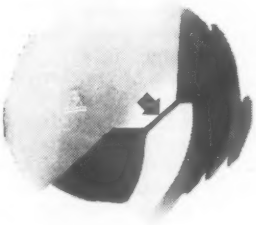
When the wear gage touches the sealing surface of the valve seat, as shown here, the bushing is worn and should be changed.



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Notice how the wear gage stands away from the sealing surface of the valve seat when the bushing is in good condition. This means long, trouble-free service ahead.

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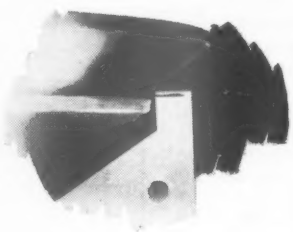
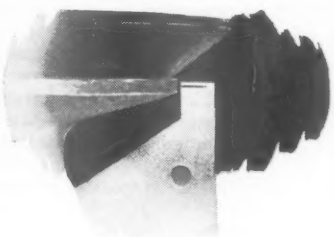


**GAGING A WORN BODY**

When the line on the wear gage is above the surface of the valve body as shown here, the body is worn and should be changed.



**HOW GAGE APPEARS ON A NEW BODY**

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*(Continued from page 80)*

level is reduced. The valve operation centers in a gas-operated diaphragm control valve. Through an electrical control the operator in the control room can determine where the liquid level is "normal", "high" or "low".

In this operation the well pressure is reduced from 1,200 to 700 lb. The crude from two wellhead separators is charged to an intermediate separator. This separator is 4 ft. 6 in. by 90 ft. and is operated in the same manner as the well separators. The pressures from the two wells are equalized by regulators which operate automatically. A daily inspection of this operation is all that is required.

Crude oil from the intermediate stabilizer is delivered to the main stabilization unit. This consists of two 6 by 180-ft. separators designed for 250-lb. pressure and three separators of the same dimension designed for 100-lb. pressure. The operation of the unit will vary dependent primarily on whether 10-lb. or atmospheric crude oil is desired. As shown in the diagram the five units are considered three to seven stages in the stabilization operation. Representative relief pressures on these stabilizers are: three, 120 lb.; four, 44 lb.; five, 26 lb.; six, 13 lb., and seven, no pressure.

Stages 4, 5, and 6 have temperature-pressure controls. In this control the vapor pressure of the three units remains constant with automatic adjustments for changes above and below 80° F. The central control room has a constant check on the level in the 10-lb. stage. Information at the main control room includes meter report on main flow lines, pressure gage on line, and water-content indicator. Small turbine lighting units at intermediate and stabilizing points are operated with pressure from gas line. As shown in the diagram gas from the operation of the stabilizer equipment is delivered to the area for domestic and other camp uses.

The third well at present is not connected to an intermediate stabilizer but is delivered at reduced pressure from the wellhead separator to the main stabilization unit. The entire unit is designed to handle approximately 140,000 bbl. of crude oil daily and additional wells will be connected to the operation later.

### Injection Operation

In 1939 the company inaugurated the practice of reinjecting part of the crude-oil fraction into the producing formation in the Masjid-i-Sulaiman field whenever necessary to secure an operating balance in supply and demand. A crude-oil topping plant located in the field which also supplies local product requirements, is an integral part of this operation. Provision was also made to return surplus products by pipe line from the Abadan refinery to the field for recycling to the reservoir.

This operation has varied from time to time. In some cases a part of the crude oil has been topped of its light fractions which are made part of the main crude-oil delivery to the refinery. The topped crude oil is then reinjected into the producing formation. In other situations it has been necessary to reverse this operating procedure, the residual oil being added to the crude-oil deliveries while the light fraction including gasoline cuts were reinjected. The bulk of the reinjected oil has been the heavy oil.

No special operating problems are involved in the actual reinjection of the products. The Masjid-i-Sulaiman field has recycle wells located around the gas cap. The fluid is pumped into these wells so that the injected oil is uniformly distributed around the formation.

The principal precaution is not to inject oils of too high viscosity. The maximum viscosity permitted is 3 centipoise. Oils of too high viscosity may affect the flow of crude oils from the wells.

For this reason the production department has complete control of the specification of the oil to be recycled. Tests indicate that the heavier oils after injection settle to just above the water level. The principal objective of this operation is to store products in formation for which there is no current demand. The alternative would be to supply large aboveground storage or curtail operations which would mean that the markets for some products would have to be supplied elsewhere.

### Drilling

Drilling operations which at present are confined to seven active rigs in four fields will be expanded later in the year with additional drilling planned for 1946. At present production drilling operations center in the Agha Jari field. The operations of this field have been expanded rapidly in line with an agreement between officials of the company and Petroleum Administration for War. The program was approved on the basis of securing a predetermined production within a specified period with a minimum of materials. This has been accomplished with plans now being completed for permanent operating facilities whenever the materials and manpower are available.

Heavy drilling equipment is required for the Agha Jari drilling operations. Special precautions are taken to combat heaving formations and high gas pressures. Special studies have been made of the use of muds in connection with these special drilling problems.

The casing program consists of: surface string, 300 ft. of 15¼-in.; 3,500 ft. of 11¾-in.; 5,500 to 6,000 ft. of 8¾-in.; oil string, 6,500 to 8,000 ft. of 6¼-in. No tubing is used in any of the fields, the oil in this case being produced through the 6¼-in. The company is planning the early use of tubular goods conforming to A.P.I. standards.

All strings are cemented to the surface. Approximately 40 rock bits are required per well in the Agha Jari field. The derrick is 136 ft. and steam is obtained from a battery of four 250-psi. working pressure boilers. Both British and American equipment is used.

In completing the wells the oil string is set as low in the cap rock as practicable above the producing formation. The well is then drilled into the limestone until the mud losses indicate the presence of a connection with production fissures. After withdrawal of the tools, the mud fluid is swabbed or bailed down until the well commences to flow thereby unloading and cleaning itself.

The other rigs at present are drilling at shallower depths and lighter equipment is used. In the Haft Kel field high-pressure gas instead of steam is used in the steam engines in generating power for the single drilling rig now in operation. Wherever feasible the company makes use of the large supplies of high-pressure gas for steam turbines, reciprocal pumps, and other pumping and power operations throughout the field.

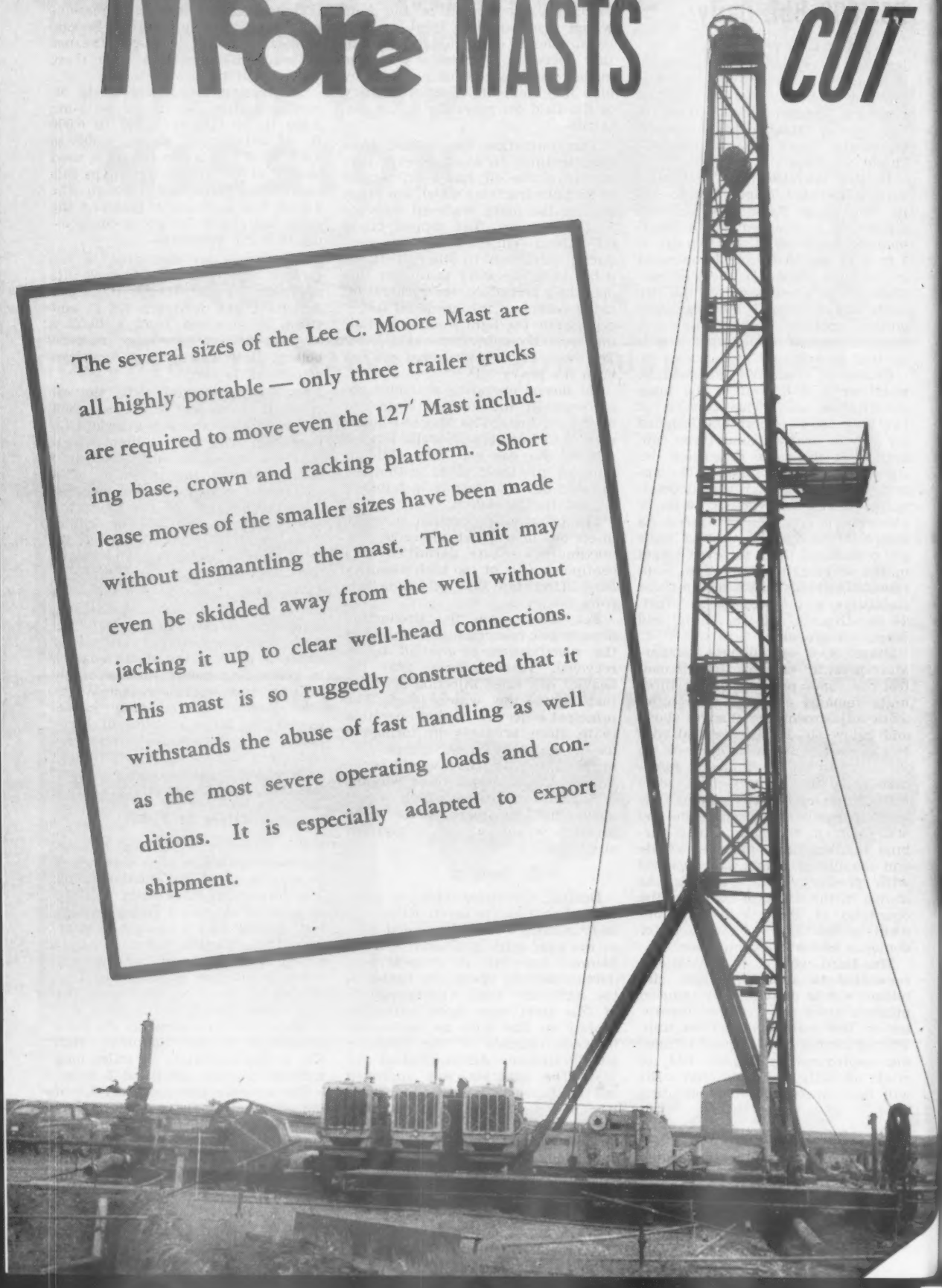
### Extent of Fields

The extent of the present producing formations has been determined in only three of the existing fields. The formations have been outlined in some of the other fields through test drilling and seismograph studies. The Masjid-i-Sulaiman field which is credited with an accumulative production in excess of 700,000,000 bbl. is 18 by 3½ miles. The area being drilled on in Agha Jari at present is approximately the same as that of Masjid-i-Sulaiman. Haft Kel is approximately 20 miles long with an average width of 3 miles.

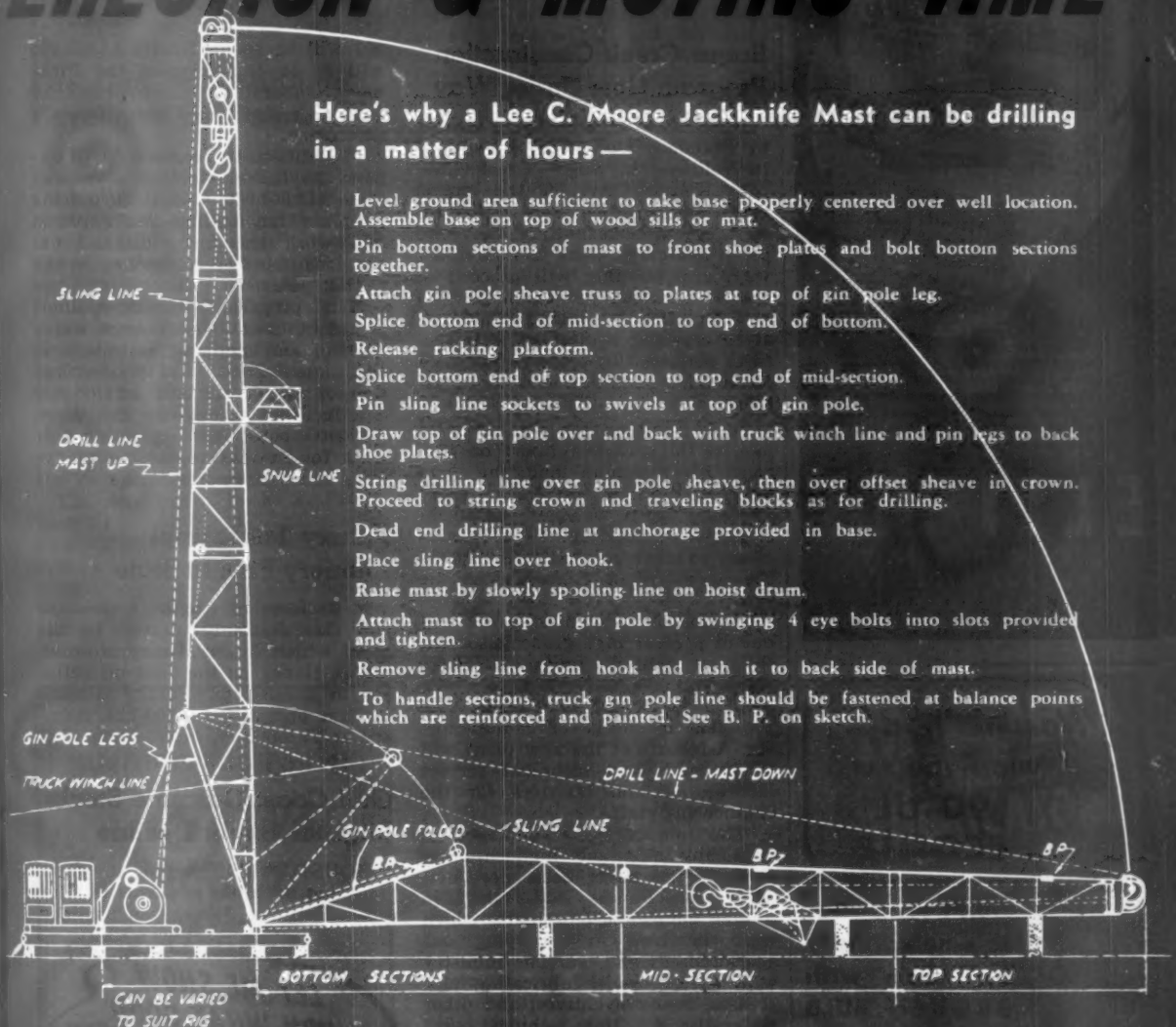
The specific gravities (A.P.I.) of the crude oil by fields at 60° F. corrected for atmospheric pressure are: Masjid-i-Sulaiman, 38.2°; Haft Kel, 38.3°; Agha Jari, 36°; Gach Saran, 38.2°; White Oil Springs, 35.4°; Lali, 38.1°, and Pazanun, light condensate.

# Moore MASTS CUT

The several sizes of the Lee C. Moore Mast are all highly portable — only three trailer trucks are required to move even the 127′ Mast including base, crown and racking platform. Short lease moves of the smaller sizes have been made without dismantling the mast. The unit may even be skidded away from the well without jacking it up to clear well-head connections. This mast is so ruggedly constructed that it withstands the abuse of fast handling as well as the most severe operating loads and conditions. It is especially adapted to export shipment.



# ERECTION & MOVING TIME




## Here's why a Lee C. Moore Jackknife Mast can be drilling in a matter of hours—

Level ground area sufficient to take base properly centered over well location. Assemble base on top of wood sills or mat.

Pin bottom sections of mast to front shoe plates and bolt bottom sections together.

Attach gin pole sheave truss to plates at top of gin pole leg.

Splice bottom end of mid-section to top end of bottom.

Release racking platform.

Splice bottom end of top section to top end of mid-section.

Pin sling line sockets to swivels at top of gin pole.

Draw top of gin pole over and back with truck winch line and pin legs to back shoe plates.

String drilling line over gin pole sheave, then over offset sheave in crown. Proceed to string crown and traveling blocks as for drilling.

Dead end drilling line at anchorage provided in base.

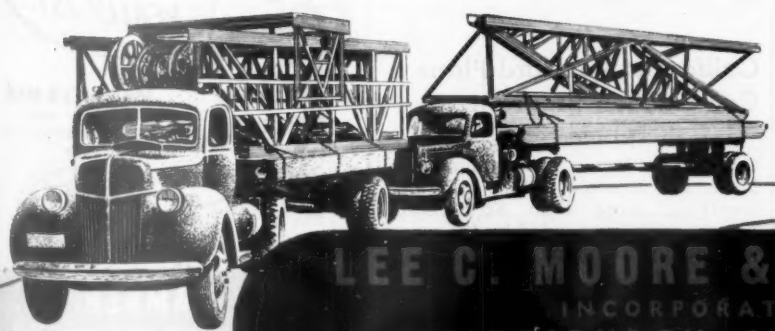
Place sling line over hook.

Raise mast by slowly spooling line on hoist drum.

Attach mast to top of gin pole by swinging 4 eye bolts into slots provided and tighten.

Remove sling line from hook and lash it to back side of mast.

To handle sections, truck gin pole line should be fastened at balance points which are reinforced and painted. See B. P. on sketch.



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# Natural Gas

## First Hearing Held Under New Texas Gas-Tax Law

AUSTIN. — Casinghead and sour gas produced in the Panhandle field of Moore and Hutchinson counties for gasoline extraction and carbon black is worth about 0.9 of a cent per 1,000 cu. ft., examiners for State Comptroller George H. Sheppard were told at the first hearing under the new law authorizing the comptroller to determine the fair market value of natural gas for tax purposes. The tax is 5.2 per cent of market value at the well, and the minimum statutory value recognized for tax purposes is 1.4 cents per 1,000 cu. ft.

## Prices Fixed for Residue Gas in Panhandle Area

WASHINGTON.—Uniform ceiling prices have been set by Office of Price Administration for residue natural gas produced in the panhandle areas of Texas and Oklahoma, when the gas is to be used in making carbon black. This action is designed to help in maintenance of a natural-gas supply for carbon-black manufacture during the reconversion period. No change is made in prices to consumers.

The new ceilings, effective October 1, are 2.75 cents for sour residue gas, and 3.25 cents for sweet gas. OPA said the adjustment was made after consultation with industry.

Heretofore there have been two ceiling prices for gas sold for the production of carbon black. On normal production the average ceiling price was 1.29 cents per 1,000 cu. ft. On certain additional production the OPA approved a price ceiling of 3.5 cents.

It is pointed out that on normal production, which includes most of the gas produced for carbon-black manufacture, the ceiling price is more than doubled, but the price on additional production will be lower.

Texas is the principal source of residue gas for channel carbon black, the demand for which has increased enormously since inauguration of the synthetic-rubber program. Channel carbon black is one of the principal ingredients of synthetic rubber.

## California Independent Gas Producers Organize

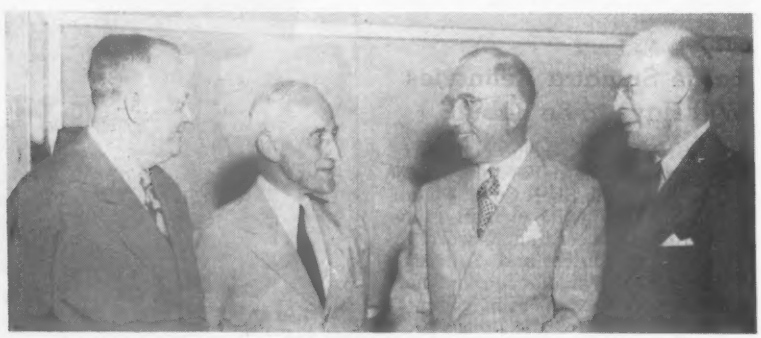
LOS ANGELES. — Independent Natural Gas Association of California has been organized with a view of protecting the interests of its members and of disseminating information concerning the industry. The organization committee comprises Robert Patterson, Belridge Oil Co.; Robert Garrison, Heilman estate; David T. Staples, Pacific Western Oil Co.

Members of the first executive committee are: Staples; C. P. Watson, Seaboard Oil Co. of Delaware; Joseph H. Gilliland, Alphonzo E. Bell Corp.; W. H. Geis, Arrowhead Oil Co.; H. A. Eklund, British American Oil Producing Co.; L. L. Aubert, Bankline Oil Co.; W. C. Whaley, Barnsdall Oil Co.; Richard A. Grant, Fullerton Oil Co.; Roy Collom, Continental Oil Co.

Among announced objects of the association are encouragement of exploration for and production of natural gas in California by private endeavor, under free enterprise; education of the public concerning the high value of natural gas as a fuel and as a source for other products; conservation of the state's natural-gas reserves.

## Gas Reserves Developed In Saskatchewan Field

UNITY, Sask.—Official figures on recent completions in the Vera-Unity field of western Saskatchewan show that substantial gas reserves have been developed. The first producer was Bata Petroleums 4, LSD 14, 25-39-23w3, finished at 1,659 ft. with 3,585,000 cu. ft. and 585 lb. pressure. Bata 6, LSD 1, same section, was small, with 734,000 cu. ft. at 1,684 ft. depth. Bata 7, LSD 13, 13-39-23w3, got 35,150,000 cu. ft. from a sand at 2,035-81 ft. and Bata 8, LSD 5, 23-39-23w3, has 14,740,000 cu. ft. Bata 9, LSD 15, 14-39-23w3, was finished recently with 3,750,000 cu. ft. initial production. The field so far developed extends approximately 3 miles north and south and 2 miles east and west, but has not been delimited.



*Officers of American Gas Association at dinner given for Maj. Alexander Forward, retiring managing director, at Hotel Waldorf Astoria: R. H. Hargrove, vice president and chairman of Natural Gas Department; Major Forward; J. French Robinson, president of A.G.A.; Everett J. Boothby, vice president and chairman of Manufactured Gas Department*

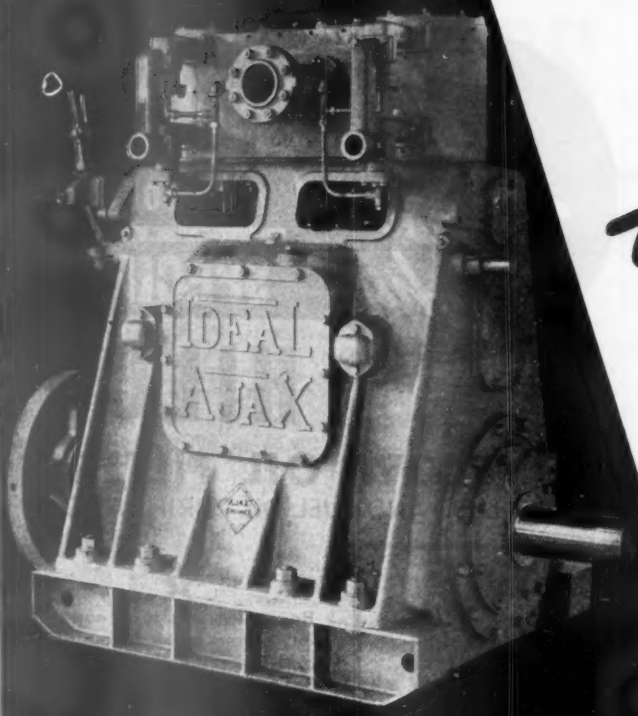
# Natural Gasoline

## Further Drop Registered in Natural-Gasoline Output

WASHINGTON. — Daily average output of natural gasoline and allied products declined slightly in July, according to Bureau of Mines, 12,894,000 gal. comparing with 12,993,000 recorded in June. Most districts, with the exception of Texas and California, reported decreases. Total demand for light products exceeded production, causing a drop of 6,530,000 gal. in inventories at plants and terminals.

**PRODUCTION**
(Thousands of gallons)

| | July | June |
|---|---|---|
| Natural gasoline | 188,623 | 183,309 |
| Natural gasoline mixture | 33,645 | 32,320 |
| Raw condensate | 34,308 | 34,113 |
| Liquefied petroleum gases: | | |
| Commercial butane-propane mixture | 18,799 | 19,571 |
| Normal butane | 33,565 | 32,301 |
| Propane | 22,148 | 21,735 |
| Other mixtures (L.P.G.) | 16,303 | 16,090 |
| Isobutane | 14,114 | 13,885 |
| Isopentane | 13,084 | 12,050 |
| Finished gasoline and naphtha | 22,185 | 21,181 |
| Other products | 2,943 | 3,231 |
| Total | 399,717 | 389,786 |

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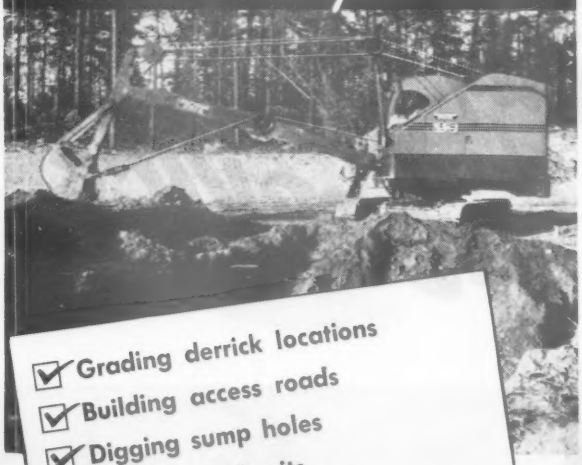

- ✓ Grading derrick locations
- ✓ Building access roads
- ✓ Digging sump holes
- ✓ Digging slush pits
- ✓ Trenching for pipe lines
- ✓ Excavating for gate valves
- ✓ Diking for tanks
- ✓ Erecting derricks
- ✓ Setting drilling machinery
- ✓ Handling pipe

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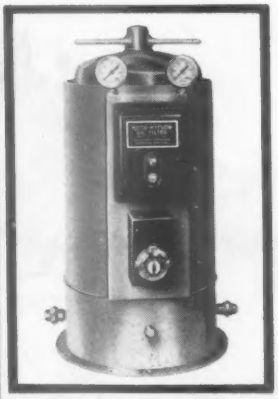

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# PIPE LINES

## Northern Natural Prepares For 51-Mile Loop Program

Northern Natural Gas Co. is preparing to start laying four loops totaling 51 miles. Pipe shipments were to start October 3 from the mills. Contracts are to be let soon.

The project includes 20 miles of 20-in. near Ogden, Iowa, east of Des Moines, and 31 miles of 24-in. to be located as follows: 14.2 miles near Beatrice, Neb.; 7 miles near Clifton, Kans., and 9.8 miles near Mullinville, Kans.

During the summer the company completed laying 35 miles of 16-in. and 24-in., contracted by Anderson Brothers. This firm has also been engaged in the laying of 24-in. for a loop with a river crossing near the company's Bushton, Kans., compressor station, where the job was supervised by R. E. Wallace, superintendent.

## Interstate Awards Gwinville Contract

Interstate Oil Pipe Line Co. has let a contract to O. E. Dempsey Construction Co. for laying 2 miles of 6-in. and 34 miles of 10-in. for the project to connect the Gwinville, Miss., producing area with its trunk system. The Dempsey organization will use for the project the spread now engaged in laying a section of United Gas Pipe Line Co.'s 142-mile 24-in. from Carthage, Tex., to Sterlington, La. At the beginning of this week Dempsey had approximately 17 miles still to lay for this section. Laying of pipe for Interstate's Gwinville project is to commence at the end of October.

Work for laying the United Gas Pipe Line Co.'s 24-in. Carthage field outlet is approximately half completed. An article by Neil Williams describing the design and construction methods for the project appears elsewhere in this issue.

## RFC Changes Its Plans Regarding WEP Lines

WASHINGTON. — Reconstruction Finance Corp. has changed its plans regarding disposition of the big-inch crude-oil line and will continue to operate it until the middle of October or later, pending further studies of its ultimate disposition.

Originally RFC announced that both war-emergency lines would be shut down before September 30. The 20-in. products line, however, stopped purchasing on September 15. RFC will go ahead with its original plans for advertising both lines for sale. But both RFC and the Surplus Property Board are completing engineering and economic studies of possible postwar uses of the lines. One suggestion has been made that, when customers no longer desire to buy crude oil from the big inch, it should be shut down but kept full of crude pending further studies. Early this week a decision was being made as to whether the 24-in. and the 20-in. lines would be drained within the next few weeks.

The O'Mahoney committee of the Senate is reported to have deferred consideration of the disposal of the War Emergency Pipe Lines, Inc., systems from the beginning of its hearings to the last of them.

## Empire Southern Lays West Texas Line

Empire Southern Gas Co. expects to complete by November 1 its 41 miles of 8⅝-in. pipe line from the Shafter Lake gas field of northern Andrews to tie into the company's 8-in. transmission line from Big Spring at a point in northwest Martin County, Texas.

The contractor, H. C. Price Co., has been carrying on the construction work for more than 2 weeks, with headquarters at Odessa, Tex., directed by R. K. Shivel, superintendent.

## Stanolind Buys West Texas Facilities From Humble

Stanolind Pipe Line Co. has acquired from Humble Pipe Line Co. gathering facilities in West Texas serving the Wasson, Ownby, and Waples-Platter areas in Yoakum and Gaines counties.

The facilities purchased include 125.36 miles of crude-oil gathering lines and 6.53 miles of service lines, totaling 131.89 miles.

The gathering-line pipe varies in diameter from 2-in. to 10-in. and includes 87.85 miles of 4-in. and 19.31 miles of 6-in. The system serves 173

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leases, with 711 wells, for which the September calendar day allowable was 25,085 bbl. daily. August runs were 31,899 bbl. daily.

Stanolind will continue to use its present connection with the Magnolia Pipe Line Co. and will lay approximately 3 miles of 6-in. and 8-in. to connect the facilities acquired from Humble with Stanolind's Wasson station.

## Corrosion Engineers Plan Technical Sessions

The National Association of Corrosion Engineers is preparing for its annual meeting and convention, May 7-9, at the President Hotel, Kansas City, Mo. There will also be an exhibition of corrosion-resistant, corrosion-mitigation and various types of protective materials in the main arena of the Municipal Auditorium.

Technical sessions are scheduled to be held at the auditorium as well as in the Little Theater and at such additional locations as may be required to accommodate sectional and group meetings.

The program will include papers on corrosion practices developed in representative industries. These will discuss what has been done for power plants, water works, transportation companies, systems with buried communication lines, chemical plants, and old pipe lines. Simultaneous sessions are scheduled to permit coverage of the program within the allotted time.

## Central Illinois to Enlarge Mattoon Facilities

WASHINGTON. — Federal Power Commission has issued a certificate of public convenience and necessity to Central Illinois Public Service Co. authorizing it to construct a 6-in. natural-gas pipe line, approximately 20 miles long, between Tuscola and Mattoon, Ill., which will enable it to obtain its natural-gas supply directly from Panhandle Eastern Pipe Line Co. to meet the requirements of customers in the Mattoon area.

The FPC order directs Panhandle Eastern to establish a physical connection of its transmission facilities at or near Tuscola, with Central Illinois proposed facilities, and dismisses an application of Kentucky Natural Gas Corp. for authorization to construct similar facilities for the purpose of augmenting the supply of natural gas sold to Central Illinois.

Illinois Commerce Commission takes the position that the present system of Central Illinois is inadequate to serve the Mattoon area, and that the proposed line from Tuscola to Mattoon should be constructed to provide "adequate and safe service" at appropriate rates.

Central Illinois purchases natural gas for its Mattoon area from Kentucky Natural at a point on the Illinois-Indiana state line. Kentucky Natural in turn receives its supply from Panhandle Eastern. To increase its present capacity to the extent required with natural gas purchased from Kentucky Natural it would be necessary for Central Illinois to expend at least $350,000 for additional pipe-line facilities, whereas its estimated cost of the proposed new interconnection with Panhandle Eastern will be about $182,900.

The proposed 6-in. line between Tuscola and Mattoon will have a capacity in excess of 5,000,000 cu. ft. of gas per day, which will be adequate to meet the estimated requirements of Central Illinois in the Mattoon area through 1950. Towns served in the area include Paris, Kansas, Ashmore, Charleston, Mattoon, Neoga, Sigel, and Effingham, Ill. Central Illinois will be able to reduce rates to its ultimate consumers in these communities because it will buy its gas supply from Panhandle Eastern at a substantially lower price than it pays Kentucky Natural.

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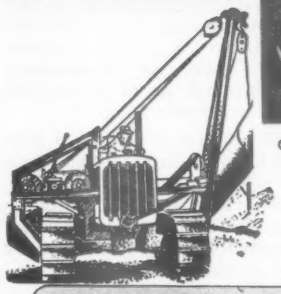
*Managing Partner*



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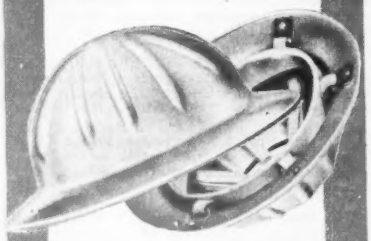

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September 6, 1945

Subject: DIAMOND Precision-Finished Roller Chain

TO ALL "CARDWELL" SALES REPRESENTATIVES:

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Beginning about four or five years ago we started to pioneer the use of Diamond precision-finished roller chain for the final rotary drive from draw works to table, and about three years ago we standardized on 1-3/4-inch pitch rotary drive chain and sprockets on the Models E, S, and O.

This chain has consistently given a very high grade of performance; outlasts two or three sets of 1030 or API No. 3 chain: and is slightly lower in first cost.

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Very truly yours,

CARDWELL MANUFACTURING COMPANY, INC.

Robert M. Smith
Sales Manager

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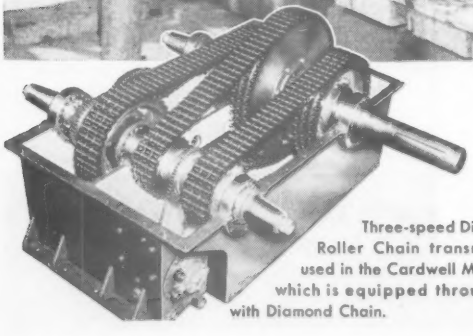

Three-speed Diamond Roller Chain transmission used in the Cardwell Model O which is equipped throughout with Diamond Chain.

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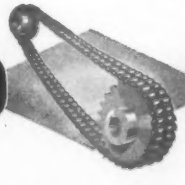
**DIAMOND**  **ROLLER CHAINS**

# Exploration and Drilling

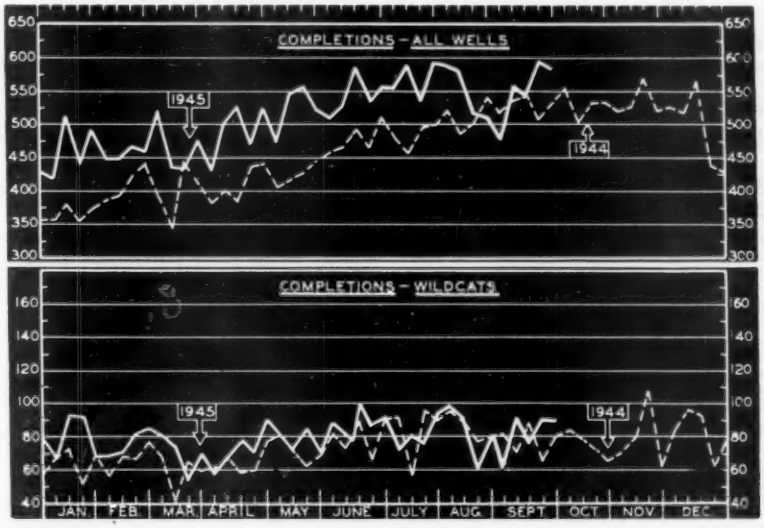
## Week's Highlights

ALL eyes in the Rocky Mountain area, and many in the Mid-Continent and on the West Coast, were turned this week toward Washakie County, Wyoming. There the first payoff on a big gamble may be in the making. The gamble, participated in by many companies, is that inner basin structures in the Rocky Mountain region will produce large quantities of high-gravity oil. (See The Oil and Gas Journal, March 10, 1945, p. 41, and March 17, 1945, p. 58).

The well that is being watched is Pure Oil Co. 1 Unit, NE NE NW 18-48n-92w, on the River structure, in the southeastern part of the Big Horn sedimentary basin, almost 15 miles west of Hidden Dome, the nearest rim structure.

Pure's test picked up the Torchlight (first Frontier sand) of the Upper Cretaceous, at 7,133 ft. and the "A" (second Frontier sand) at 7,242 ft. It cored tight sand, with gas and odor, at 7,143-53 ft., then cored continuously to 7,171 ft., with a reported 20 ft. of fairly well-saturated sand in the section. An electric log was run. Then coring continued, with saturation cored from 7,242 to 7,310 ft.

A drill-stem test was made at 7,229-72 ft. With the valve open 8 minutes, it started flowing gas in 2 minutes, and flow increased rapidly to an estimated rate of 5,000,000 cu. ft. daily through a ¼-in. choke on 4½-in. drill pipe. When the valve was closed and pipe pulled, a recovery of 47 ft. of 54°-gravity condensate was reported. The flowing pressure was 2,800 lb. psi., and the shut-in bottom-hole pressure built




*Solid line charts current weekly completions, service wells in Eastern area included*

## WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 29, 1945

| | Total of all wells | | | | | Cum. to date | | Wildcat completions and discoveries | | | | | Cumulative total, 1945 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comp. | Oil | Gas | Dry | Footage | 1945 | 1944 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 30 | 15 | 0 | *15 | 42,600 | 1,083 | 1,179 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 74 | 36 | 8 | †30 | 118,445 | 3,067 | 3,057 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Virginia | 13 | 3 | 8 | 2 | 30,146 | 601 | 642 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ohio | 27 | 2 | 9 | 16 | 79,882 | 700 | 739 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 11 | 49 | 60 |
| Indiana | 3 | 2 | 0 | 1 | 5,378 | 148 | 186 | 0 | 0 | 0 | 1 | 1 | 5 | 0 | 0 | 23 | 28 |
| Kentucky | 12 | 8 | 0 | 4 | 9,027 | 389 | 542 | 0 | 0 | 0 | 0 | 0 | 19 | 0 | 4 | 38 | 61 |
| Illinois | 36 | 23 | 0 | 13 | 90,645 | 1,329 | 1,385 | 1 | 0 | 0 | 5 | 6 | 37 | 0 | 0 | 236 | 273 |
| Michigan | 22 | 10 | 1 | 11 | 54,133 | 557 | 480 | 2 | 0 | 0 | 8 | 10 | 9 | 0 | 3 | 197 | 209 |
| Kansas | 44 | 25 | 5 | 14 | 134,883 | 1,280 | 1,347 | 1 | 0 | 0 | 8 | 9 | 28 | 0 | 12 | 255 | 295 |
| Neb., Mo., Iowa | 0 | 0 | 0 | 0 | 0 | 18 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 13 |
| Oklahoma | 64 | 39 | 5 | ‡20 | 231,734 | 1,812 | 1,331 | 5 | 0 | 0 | 6 | 11 | 69 | 3 | 15 | 271 | 358 |
| Texas | 163 | 91 | 17 | 55 | 712,187 | 5,348 | 4,128 | 3 | 0 | 1 | 28 | 32 | 160 | 12 | 48 | 949 | 1,169 |
| North Central | 61 | 35 | 2 | §24 | 141,456 | 1,639 | 1,100 | 2 | 0 | 0 | 9 | 11 | 62 | 0 | 5 | 333 | 400 |
| West | 34 | 28 | 0 | 6 | 177,163 | 1,334 | 1,144 | 0 | 0 | 0 | 6 | 6 | 42 | 1 | 0 | 192 | 235 |
| Panhandle | 15 | 4 | 9 | 2 | 47,155 | 417 | 193 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 6 |
| Eastern | 5 | 1 | 2 | 2 | 33,243 | 250 | 240 | 0 | 0 | 1 | 2 | 3 | 5 | 6 | 2 | 64 | 77 |
| Gulf Coast | 38 | 21 | 4 | 13 | 279,920 | 1,217 | 929 | 1 | 0 | 0 | 6 | 7 | 38 | 4 | 31 | 214 | 287 |
| Southwest | 10 | 2 | 0 | 8 | 33,250 | 491 | 522 | 0 | 0 | 0 | 5 | 5 | 13 | 1 | 9 | 141 | 164 |
| Louisiana | 29 | 16 | 5 | 8 | 182,127 | 782 | 597 | 1 | 0 | 0 | 2 | 3 | 25 | 3 | 6 | 94 | 128 |
| Northern | 18 | 10 | 5 | 3 | 69,807 | 315 | 237 | 1 | 0 | 0 | 1 | 2 | 7 | 1 | 6 | 53 | 67 |
| Southern | 11 | 6 | 0 | 5 | 112,320 | 467 | 360 | 0 | 0 | 0 | 1 | 1 | 18 | 2 | 0 | 41 | 61 |
| Arkansas | 5 | 5 | 0 | 0 | 32,214 | 132 | 166 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 28 | 29 |
| Mississippi | 8 | 7 | 0 | 1 | 37,611 | 274 | 108 | 0 | 0 | 0 | 1 | 1 | 5 | 0 | 0 | 89 | 94 |
| Southeastern | 2 | 1 | 0 | 1 | 8,988 | 45 | 36 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 31 | 33 |
| Montana | 6 | 5 | 0 | 1 | 19,580 | 237 | 266 | 0 | 0 | 0 | 1 | 1 | 7 | 0 | 0 | 20 | 27 |
| Wyoming | 5 | 4 | 0 | 1 | 17,197 | 159 | 128 | 0 | 0 | 0 | 1 | 1 | 14 | 0 | 1 | 30 | 45 |
| Colorado | 1 | 1 | 0 | 0 | 5,705 | 37 | 28 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 7 | 9 |
| New Mexico | 6 | 4 | 0 | 2 | 35,119 | 311 | 290 | 0 | 0 | 0 | 1 | 1 | 8 | 0 | 4 | 46 | 58 |
| California | 33 | 26 | 0 | 7 | 115,560 | 1,714 | 1,484 | 1 | 0 | 0 | 4 | 5 | 3 | 0 | 2 | 171 | 176 |
| Total United States | 583 | 323 | 58 | 202 | 1,963,161 | 20,023 | 18,149 | 15 | 0 | 1 | 72 | 88 | 392 | 18 | 108 | 2,547 | 3,065 |
| Total previous week | 596 | 308 | 67 | 221 | 2,068,423 | 19,440 | 17,619 | 8 | 1 | 4 | 77 | 90 | 377 | 18 | 107 | 2,475 | 2,977 |
| Total Sept. 30, 1944 | 541 | 288 | 56 | 197 | 1,659,054 | 18,149 | 12,972 | 11 | 3 | 2 | 65 | 81 | 331 | 23 | 96 | 2,389 | 2,839 |

Service wells included: *15, †26, ‡1, §4.

up rapidly to 3,800 lb.

Drilling has been resumed, and it is planned to core and test the Peay (Lower Frontier) sand, then ream and run a protective string of 9⅝-in. pipe before continuing to the Embar-Tensleep, which may be 13,000 ft. deep.

So far practically all Rocky Mountain production is from rim structures around the sedimentary basins. Out in the basins a great geophysical and land play has been gaining momentum for several years, on the theory there would be deep structures with thick sands and high-gravity oil.

## APPALACHIAN FIELD

### Eastern W. Va. Wildcat Runs Structurally High

PITTSBURGH.—In Portland district, Preston County, West Virginia, Wm. E. Snee et al topped the Oriskany sand at 5,917 ft. in the wildcat on Harry Sisler farm on Briery Anticline and is drilling in the sand. This test had only 160 ft. of Corniferous lime compared with 232 ft. in the first test and instead of running on the top of the Oriskany, is now about 12 ft. higher. If the sand condition follows other tests to the southwest and to the east, the "B" member of the Oriskany could possibly be the producing horizon instead of the "A" member on account of the porosity.

In German Township, Fayette County, Peoples Natural Gas Co. completed a 3,524,000-cu. ft. Injun sand gas well on the Pietro Giralomi farm. The sand was topped at 1,915 ft. gas 2,023-26 ft., total depth 2,030 ft. Manufacturers Light & Heat Co. in same area completed 1 Puritan Coke Co. gaging 525,000 cu. ft. gas from the Injun sand 1,424-1,604 ft. gas 1,517 ft., gas 1,525 ft. and 1,529 ft., total depth 1,615 ft.

In Tucker County, a drill-stem test of the deep wildcat on the Kuykendall Unit in Dry Fork district being drilled by Ohio Oil Co., showed no gas although the mud at the top of the Oriskany sand at 8,250 ft. showed some gas. As the Oriskany is very susceptible to water and mud, it is possible that no test will be made until the hole is cleaned.

New locations totaled 10 of which 2 were in Armstrong County, 2 in Indiana County, and 5 in Washington County.

## SOUTH LOUISIANA

### California Co. Gets Good Well in Barataria Field

NEW ORLEANS.—In Barataria field of Jefferson Parish, The California Co. 1 Fleming et al Unit 1, flowed a state potential of 355 bbl. daily through a 5/32-in. choke from perforations at 11,486-528 ft. Gravity is 33.6° with gas-oil ratio 790 to 1, total depth is 11,622 ft.

Magnolia Petroleum Co. 1 J. A. Manceaux, in the West Gueydan field of Vermilion Parish, flowed 250 bbl. daily of 37° gravity on potential test through an 8/64-in. choke from perforations at 10,776-80 ft. Gas-oil ratio was 1,200 to 1, total depth is 10,835 ft.

In the South Elton area in Jefferson Davis Parish, Stanolind Oil & Gas Co. 1-B W. H. Tupper, 28-7s-3w, was completed as a gas-condensate producer through perforations at 8,991-9,001 ft. The flow was 465,000 cu. ft. of gas with 32 bbl. of condensate per day through a ⅛-in. choke, tubing pressure 2,614 lb., casing pressure 2,718 lb. Gas-oil ratio 14,400 to 1. Total depth is 9,425 ft. and a series of tests had been run at various levels before final completion was made. Stanolind had opened oil production in this area in March of this year at the 1 W. H. Tupper, which was completed for 237 bbl. per day of 38° gravity oil flowing through a 10/64-in. choke, tubing pressure 2,200 lb., casing pressure 2,325 lb.

Deep drilling continues in the South Louisiana District with Humble Oil & Refining Co. 1 State-Lake Salvador, wildcat in Lake Salvador, St. Charles Parish, drilling below 11,055 ft. in shale and sandy shale. Also in Allen Parish, Humble 1-B Mrs. J. A. Bel, 33-5s-4w, wildcat in the Oberlin area, is drilling 10,795 ft. in sandy shale. In St. Mary Parish Humble 1 Warren Kearney, second test in the Bayou Carlin area, is drilling at 10,175 ft. in sandy shale.

There were 20 new locations reported this week, 2 being wildcats, 1 each in Beauregard and Vermilion parishes. Of the 11 completions the only wildcat was a dry hole in St. Landry Parish. Beauregard, Cameron, St. Landry, and Vermilion parishes led in completions with two each.

**SOUTH LOUISIANA WILDCAT FAILURE**

St. Landry Parish: Ralph E. Yates et al 1 J. G. Meyer, 15-5s-7e, dry, TD 5,192 ft.

## TEXAS GULF COAST

### World's Deepest Test Is Abandoned

HOUSTON.—The deepest hole in the world drilled by Phillips Petroleum Co. 1 mile west of Millican townsite in Brazos County has been abandoned at a total depth of 16,655 ft. This test, 3 Fanny Schoeps, had gas with some condensate on several tests in the deep zones, but operators were unable to complete it as a commercial well.

In the North Houston area of Harris County Union Producing Co. 1 Langtry, ETRR Survey, recovered oil on drill-stem tests at 6,993-97 ft., and 7,087-92 ft. Operators are now coring ahead from 7,250 ft.

Another deep test abandoned this week is the Gulf Oil Corp. 1 J. T. Hooks Estate, Inc., in the old Hankamer field of Liberty County. This test was drilled to a total depth of 13,010 ft.

Glen H. McCarthy 1 D. W. Price et al Unit, new well in the Blue Lake area of Brazoria County, flowed a state test potential of 170 bbl. per day on a 9/64-in. choke, tubing pressure 1,100 lb. gas-oil ratio 750 to 1. Sand was topped at 8,626 ft. with casing set on top of the sand, and total depth is 8,645 ft.

There were 19 new locations reported this week including 5 wildcats, 1 each in Colorado, Fort Bend, Harris, Jefferson and Montgomery counties. Of the 26 completions only 5 were wildcats, 1 discovery well in Colorado County and 4 dry holes.

**UPPER GULF COAST SUCCESSFUL WILDCAT**

Colorado County: New oil pool, Hamel field—Skelly Oil-Warren Petroleum 1 R. Hamel, R. Dowdy Survey, 9 mi. SW of Columbus, top of Wilcox sand 9,032 ft., TD 9,706 ft., perforated with 72 holes 9,052-69 ft. in Wilcox, PT 217 bbl. daily through 3/16-in. choke, gas-oil ratio 5,640 to 1, TP 1,825 lb., gravity 46.3°, no water.

**UPPER GULF COAST WILDCAT FAILURES**

Brazos County: Phillips Petroleum Co. 3 Fanny Schoeps, Millican area, E. M. Millican Survey, 1 mile west of Millican, world's deepest hole, dry at 16,655 ft.

Lavaca County: Sterling Oil & Refining Co. 1 John Muhlstein, Sr., et al, G. W. and W. H. Scott League, Abstract 45, 11 miles northeast from Hallettsville, dry at 7,006 ft.

Orange County: Gulf Oil Corp. 1-A The Caswell Trust, BBB&C Survey, Abstract 50, dry at 10,195 ft.

San Jacinto County: Jack W. Frazier 1

### DAILY AVERAGE PRODUCTION FOR WEEK

| | Sept. 29 crude oil | Distillate, allied products | October PAW quota all oils | Sept. 22 crude oil |
|---|---|---|---|---|
| Alabama | 200 | ..... | 500 | 250 |
| Arkansas | 76,350 | 5,400 | 80,400 | 78,000 |
| California | 860,150 | 60,970 | 946,970 | 885,750 |
| Colorado | 12,400 | ..... | 12,000 | 11,650 |
| Eastern | 63,400 | 6,300 | 72,500 | 63,950 |
| Florida | ..... | ..... | ..... | ..... |
| Illinois | 189,200 | 12,000 | 212,000 | 204,550 |
| Indiana | 12,900 | ..... | 13,000 | 13,200 |
| Kansas | 272,500 | 4,500 | 278,500 | 273,450 |
| Kentucky | 29,200 | 2,600 | 30,600 | 29,500 |
| Louisiana | 362,850 | 42,000 | 392,000 | 363,800 |
| North Louisiana | 70,850 | ..... | ..... | 71,800 |
| South Louisiana | 292,000 | ..... | ..... | 292,000 |
| Michigan | 41,200 | 800 | 47,800 | 45,100 |
| Mississippi | 52,550 | ..... | 47,000 | 51,050 |
| Montana | 23,550 | 300 | 23,800 | 23,300 |
| Nebraska | 900 | ..... | 1,000 | 850 |
| New Mexico | 107,300 | 6,800 | 106,800 | 107,300 |
| Oklahoma | 391,300 | 28,000 | 408,000 | 394,600 |
| Texas | 1,889,500 | 166,000 | 2,034,000 | 1,889,500 |
| East Texas | 315,300 | ..... | ..... | 315,300 |
| East Central Texas | 128,450 | ..... | ..... | 128,450 |
| North Central Texas | 141,900 | ..... | ..... | 141,900 |
| Texas Panhandle | 88,000 | ..... | ..... | 88,000 |
| West Texas | 452,000 | ..... | ..... | 452,000 |
| Southwest Texas | 296,150 | ..... | ..... | 296,150 |
| Texas Gulf Coast | 467,700 | ..... | ..... | 467,700 |
| Wyoming | 95,700 | 3,500 | 96,700 | 101,550 |
| Total United States | 4,481,150 | 339,170 | 4,803,570 | 4,537,350 |
| Change from prev. week down | 56,200 | | | |

Total production January 1-September 29, 1945 ..... 1,304,423,625 bbl.
Same period last year ..... 1,233,779,620 bbl.

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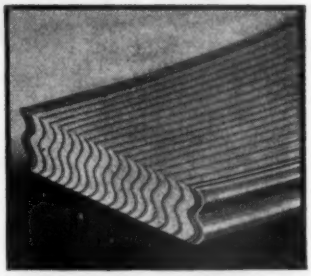

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# GARLOCK

Mrs. W. S. Dixon et al, 1 mile southeast of Shepherd, in Uriah Gibson Survey, dry at 8,511 ft.

## CANADIAN FIELDS

### Taber Field Gets Two Producers

CHATHAM.—In the Taber field, southern Alberta, Taber-Province 47-15A, LSD 15, 15-9-17w4, finished at 3,185 ft., pumped 108 bbl. initial production. Commonwealth-Taber 1, LSD 11, 22-9-17w4, is on the pump and estimated at 35 to 40 bbl.

**Hay Lake Dome.**—On the Hay Lake Dome, west of the old Red Coulee field, Admiral-British Dominion 1, LSD 7, 22-1-17w4, finished at 3,094 ft. in the top of the Madison limestone, and filled up 3,300 ft. in 4½-in. pipe in an hour. Potential is estimated about 50 bbl. per day.

**Steveville.**—In the Steveville - Princess field, eastern Alberta, Patricia 1, LSD 4, 6-20-12w4, has finished tests in the Sunburst sand and is deepening to the Madison. Two tests in the Sunburst showed gas flows of about 2,000,000 cu. ft. California-Standard Princess-C.P.R. 18-22A is swabbing in Devonian limestone at 3,961 ft. with good oil shows but insufficient gas and will likely install pump. Princess-C.P.R. 76-23-A, LSD 12, 23-20-12w4, is starting.

**Turner Valley.**—In South Turner Valley, Mercury-Mill City 1, LSD 10, 16-18-2w5, finished high with Madison at 6,437-6,890 ft. and is testing, with indications of a better than average producer.

**Frog Lake.**—In the northern plains area of Alberta west of Frog Lake, Shell Oil Co. of Canada has secured exploration rights on 142,236 acres, mainly in Townships 53, 54, 55 and 56, in Ranges 8, 9, and 10w4. The area is about 20 miles north of Wainwright and 12 miles north and 6 miles east of the Vermilion field. Immediately east, two Iscris wells in the Rusylvia area have encountered good oil showings.


Big Smoothies

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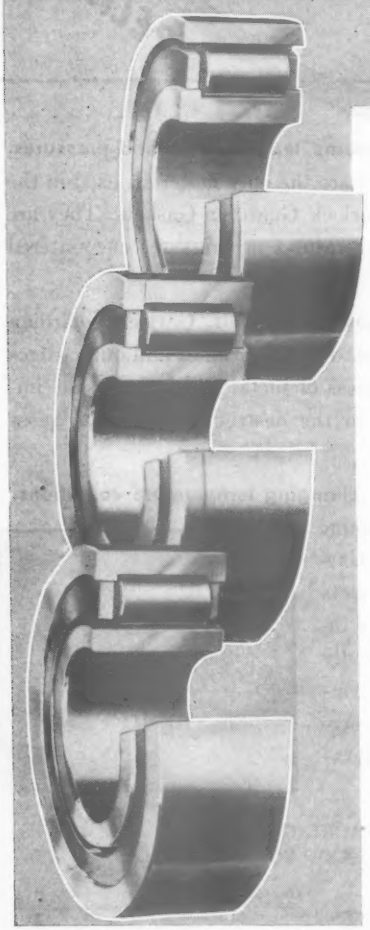

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## SOUTHWEST TEXAS

### Bee County Gets New Oil Pool

CORPUS CHRISTI.—A new oil field 16 miles northwest of Beeville in Bee County has been opened by Tom Graham 1 Theis et al, in the R. S. Barnes Survey, Abstract 115. Oil sand was recorded at 3,571-79 ft., and 5½-in. casing was set on bottom at 3,587 ft. The discovery is testing through perforations at 3,573-82 ft., and on a 9-hour test flowed 70 bbl. Potential has not been reported. In the same area, Tom Graham has staked locations for 2, 3, and 4 Albert Theis et al.

Sun Oil Co. 5 D. J. Sullivan et al, in Loma Blanca Grant of Brooks County, has been completed as a gas-condensate well in sand at 8,255-65 ft. making an estimated 25 bbl. of condensate and an ungaged flow of gas daily. It opens a new condensate pool for the county. No final potential on the production has been taken. Sun announced that location for 6 Sullivan has been staked in the El Tule Grant, to be drilled to 10,000 ft.

Nine miles southeast of Goliad, Ginther, Warren & Ginther 3 Carrie G. Wood, in Geo. Villa Survey, Goliad County, built up a pressure of 500 lb. in 6 minutes on a drill-stem test in Frio sand at 4,148-60 ft. Operators now are carrying the test deeper to the Vicksburg and the test is below 4,550 ft. in sandy shale.

Continental Oil Co. 1 Frank Rundus, wildcat, 5 miles north of Cistern, in Wm. Medford League, Bastrop County, was abandoned at total depth of 4,344 ft.

Twenty-seven new locations were reported this week, 9 wildcats, 1 each in Bee, Brooks, Jim Wells, Karnes, Kleberg, Milam, and McMullen counties, and 2 in San Patricio. Of the 22 completions this week, 7 were wildcats, all dry, 2 in Jim Hogg County, and 1 each in Bastrop, Calhoun, Jim Wells, Milam, and Zapata counties. Jim Wells, Nueces, and Starr counties led in completions with three each.

**SOUTHWEST TEXAS WILDCAT FAILURES**

Bastrop County: Continental Oil 1 Frank Rundus, Wm. Medford League, 5 mi. N of Cistern, dry, TD 4,344 ft.

Calhoun County: Quintana Petroleum Corp. 1 John M. Boyd, Bonifacio Rodriguez Survey, 5 mi. NW of Port Lavaca, dry, TD 8,615 ft.

Jim Hogg County: M. L. Massingill 1 E. Rodriguez, Las Cuevitas Grant, Block M-1, 2 mi. W of Cuevitas, dry, TD 3,212 ft.

Texon Royalty Co.-Drilling & Exploration Co. 2 Hector Vela, El Peyote Grant, 19 mi. SW of Hebbronville, dry, TD 2,220 ft.

Jim Wells County: Slick Oil Co. 1 R. R. Mullen, J. Poitevent Survey 207, 3 mi. S of Alice, dry, TD 5,558 ft.

Milam County: Glenn & Harding 1 J. S. Jacobs, Jose Leal Survey, 7 mi. N of Minerva field, dry, TD 1,123 ft.

Zapata County: Navillus Oil Well Servicing Co. 1 Martiniano Garza Est., Comitas Grant, Douglas Subdivision, Block 76, 4 mi. S of Escobas, dry, TD 2,707 ft.

# ILLINOIS

## Mattoon Field Presents 1,000-Bbl. Aux Vases Well

MATTOON.—The largest well of the score of producing completions in the Mattoon field in Coles County is credited to J. A. Kull, whose 1 Edward C. Craig, NE NE NW 26-12n-7e, in the past week flowed 600 bbl. of oil in 11 hours and 500 bbl. in the next 14 hours. It had been shot with 100 qt. of ntroglycerin at 1,916-64 ft., taking in all of the Aux Vases section at 1,920-32 ft. and the Ste. Genevieve section topped at 1,948 ft., total depth 1,974 ft. Following its 25-hour flow it fell to an average of 25 bbl. per hour.

S. D. Pearce, trustee, 1 Boultinghouse, NE SE SW 6-4s-14w, gave a new pay to the North Calvin pool in White County. It swabbed 300 bbl. in 24 hours from Cypress sand at 2,698-2,713 ft. after a 20-qt. shot at 2,700-10 ft. It had been drilled to 3,149 ft. and plugged back to 2,720 ft.

Thirty-six wells were completed during the week including 23 oil wells and 13 dry holes. Most of the new oil wells were relatively small, the average being 110 bbl. per well for the entire 23 new producers. Omitting the two good wells above mentioned, the average of the others was around 60 bbl. per well.

Forty-three new operations were started during the week. Fourteen of these were wildcats in 11 counties, as follows: Clinton County, Max Conrey 1 C. Myer, SW NW SW 18-1n-3w; Coles County, T. B. Dirickson 1 N. Linder, NE SE SW 27-12n-7e, and A. M. Myers 1 F. E. Wilson, SW SW SW 5-10n-7e; Cumberland County, T. B. Dirickson 1 Bingamon, SW SW SW 5-10-7e, and Black, Chumley & James 1 Gaddis, NW NE NE 29-11n-7e; Effingham County, George Engle 1 Parks, 40 ft. from north and 330 ft. from west lines NW NW 34-7n-5e; Madison County, Lessing Alch 1 C. Mick, NE SE NE 29-4n-7w; Jefferson County, Brehm & Robinson 1 B. Copple, 330 ft. from north and 380 ft. from west lines SE NE 12-1s-1e; St. Clair County, C. W. Young 6 McCurdy, C SW SW 29-3s-6w; Wabash County, R. B. Martin and Wood 1 T. Schnerkan, SE SW NE 35-2n-14w; Washington County, Glenwood Oil Co. 1 Marticcio, NE SW NW 12-2s-1w; Wayne County, Aetna Oil & Gas Co. 1 Travers, NW SW SE 27-1n-9e, and Central Pipe Line Co. 1 Metcalf, SW NE NE 5-2s-9e; White County, Lario Oil & Gas Co. 1 E. Organ, NW NW NE 35-4s-9e.

### SUCCESSFUL ILLINOIS WILDCAT

Jasper County: W. W. Schaeffer 1 Stifal, SW NW SE 2-7n-10e, Aux Vases 2,469-2,500 ft. and Roseclaire 2,540-53 ft. Shot with 20 qt. at 2,542-52 ft. Pumped 25 bbl. in 24 hours. A pool opener.

### ILLINOIS WILDCAT FAILURES

Marion County: George Engle 1 Vursell, SE SE NW 12-2n-3e, dry at 2,774 ft. Menard 1,948 ft., Cypress 2,371 ft., Benoist 2,582 ft., Aux Vases 2,619 ft., McClosky 2,748 ft.

H. F. Robinson 1 Vaughn, SW SW SW 36-3n-1e, dry at 2,103 ft. Menard 1,324 ft., Cypress 1,682 ft., Benoist 1,855 ft., Aux Vases 1,918 ft., McClosky 2,041 ft., St. Louis 2,099 ft.

Tazewell County: Pekin Oil Prospect 1 DeSutter, NE SE NW 8-23n-6w, dry at 1,503 ft. No log.

Wabash County: Texas 1 Wiseman, SE NE NW 15-2s-14w, dry at 3,074 ft. Tar Springs 2,285 ft., Cypress 2,633 ft., Benoist 2,849 ft., Aux Vases 2,893 ft., McClosky 3,001 ft., St. Louis 3,041 ft.

White County: Carter Oil 1 J. Cribs, NW NE NE 13-4s-8e, dry at 3,565 ft. Upper Kincaid 2,199 ft., Cypress 3,118 ft., Benoist 3,198 ft., Aux Vases 3,340 ft., McClosky 3,439 ft.

Phillips Petroleum 1 Bourland, SE SE

# *Famous Facts*

Final arrangements for the purchase of Alaska from Russia on March 30, 1867, for $7,200,000, were made by members of the United States State Department and officials of the Russian Empire. Present at this memorable meeting in Washington, D. C., were (left to right) William H. Seward, Secretary of State, who sponsored the purchase; William Hunter, 2nd Assistant Secretary of State; Wlademar Bodisco, Charge d'Affaires of the Russian Empire to the United States; Edward de Stoeckl, Charge d'Affaires; Charles Sumner, Senator; and Fred W. Seward, Assistant Secretary of State.

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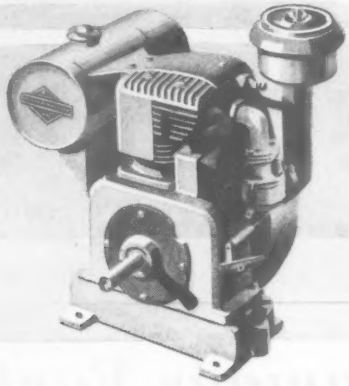

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## MICHIGAN

### Montcalm County Test Opens New Field

SAGINAW. — Two wildcat producers were among the 10 producing wells completed in Michigan in the past week, as 11 tests were dry, 8 of these being wildcats, and 1 gas well also was completed. Fifteen new locations were announced.

The state oil advisory board will meet October 9 to consider a proposed 20-acre diagonal drilling pattern for a new Montcalm County pool. The conservation department says this is "the most promising since the Coldwater pool was discovered in August 1944". The Montcalm discovery is the Leslie T. Barber-Michigan Consolidated Gas Co. 1 Gyger et al. W/2 SE NW 1-11n-7w, Douglas Township. Initial potential was 358 bbl. a day. It flowed without acidizing from the Dundee at 3,397 ft.

The second wildcat producer of this week is the C. W. Teater 1 Ignash, SE SE SE 21-18n-13e, Huron County, pumping 27 bbl. a day natural from 2,878 ft. Two more big wells in Arenac's Deep River field and another in the Isabella-Coldwater field provided most of the more than 10,000 bbl. daily potential of the new producers.

The conservation department announcel spacing patterns for 20 of 22 Michigan fields partially developed during the war years will remain on a 40-acre basis. The Bloomer - Montcalm and Headquarters-Rosecommon fields have been put on a 20-acre pattern. As a general rule all the shallow southwest Michigan wells may be drilled on 10-acre units up to 1,700 ft. and on 20-acre patterns at greater depths.

Six of the 15 new locations are in Deep River Township, one in Adams of Arenac. The others are in Rosecommon, Ogemaw Bay, Osceola, Montcalm, Huron, Clare, and Mecosta.

#### MICHIGAN SUCCESSFUL WILDCATS

Huron County, Dwight Township: Charles W. Teater 1 Ignash, SE SE SE 21-18n-13e, pumped 27 bbl. natural, TD 2,878 ft.

Montcalm County, Douglas Township: Leslie T. Barber - Michigan Consolidated Gas Co. 1 Gyger-Barber-State, C W½ SE NW 1-11n-7w, flowed 358 bbl. natural, TD 3,397 ft. in Dundee.

#### MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: C. W. Cook-W. S. Cook 1 Reeves, NE NW NW 5-2n-13w, dry in Traverse, TD 1,524 ft.

Gladwin County, Bourret Township: H. E. Bell 1 State-Bourret, SE NW SE 36-20n-2e, dry in Dundee, TD 3,123 ft.

Gratiot County, Elba Township: A. E. Williams 1 Cook, SW SE SE 14-9n-1w, dry in Traverse, TD 2,600 ft.

Kent County, Algoma Township: W. S. Cook 1 A. Erickson, NW NW NE 19-9n-11w, dry in Traverse, TD 2,356 ft.

Missaukee County, Riverside Township: Gulf Refining 1 Ponstine, C W½ NE SE 25-21n-7w, dry in Dundee, TD 3,969 ft.

Muskegon County, Holton Township: Michigan Development Co, 1 Koscinski, SE NW SW 2-12n-15w, dry, TD 1,365 ft.

Mewaygo County, Monroe Township: West Michigan Consolidated Co. 1 Trail's End Club, C SW NE NE 33-15n-12w, dry, TD 1,044 ft.

Ottawa County, Holland Township: C. E. Grimes 1 Scott, NE NW SE 20-5n-15w, dry in Traverse, TD 1,552 ft.

# LA.-ARK.

## New Pool Discovered In Lincoln Parish

SHREVEPORT.—The California Co. 1 Nobles, 676 ft. north and 515 ft. east of the SW cor. 12-19n-4w, has opened a new pool for Lincoln Parish. The well produced an initial of 145 bbl. from the Cotton Valley at 8,700-50 ft., after drilling to a total depth of 9,137 ft. This new pool is situated about 12 miles east of Sugar Creek, and about 10 miles northwest of the Ruston gas field.

North Louisiana announced 18 completions this week, including 10 oilers, 5 gas wells, and 3 dry holes. New locations totaled 15, including 3 wildcat starts. One wildcat each is scheduled for Bossier, La Salle and Natchitoches parishes.

In the Arkansas fields, five oil wells were completed this week, with no failures and no wildcats. Stephens and Atlanta pools tied with two oilers apiece, and the Magnolia pool completed a workover well for 101 bbl. Nine new locations are starting, including four wildcat tries, to be drilled in Calhoun, Logan, Miller and Ouachita counties.

**NORTH LOUISIANA SUCCESSFUL WILDCAT**

Lincoln Parish: New Oil Pool—California 1 Nobles, 676 ft. north and 515 ft. east of SW corner of 12-19n-4w, 145 bbl. from Cotton Valley at 8,700-50 ft., TD 9,137 ft.

**NORTH LOUISIANA WILDCAT FAILURE**

Natchitoches Parish: E. H. Demetrio 3 Prudential Life, 660 ft. south and 330 ft. west of NE corner of 16-10n-9w, dry, TD 750 ft.

# N. CENTRAL TEXAS

## Montague County Getting Pool Near Belcherville

WICHITA FALLS.—Venmex Oil Co. and Aro Equipment Co. 1 Beakley, Block 21, M. Garnett Survey, wildcat 1 mile east of Belcherville, Montague County, drilled saturated conglomerate from 5,347-60 ft. On a 36-minute drillstem test it showed gas in 2 minutes and flowed oil in 36 minutes. Operators were drilling deeper below 5,439 ft. J. A. Chapman 1-A Fowler, Block 7, Limestone County School Land Survey, ½ mile southwest extension to the Johnson pool of western Montague. drilled saturated conglomerate from 5,978-94 ft. On a drillstem test from 5,980-94 ft., gas showed in 2 minutes and flowed oil in 13 minutes. It was being drilled ahead. The first failure for the Johnson pool is Continental Oil Co. 1 Corpening, Block 6, Limestone County School Land Survey, ½ mile northeast of the discovery.

Continental 1 R. M. Ramzy, D. K. Davis Survey, Jack County wildcat 9 miles southeast of Jacksboro, was drilling below 6,396 ft. in shale. Mid-Continent Petroleum Corp. has staked 1 J. V. Morris, a 7,500-ft. wildcat 1 mile northeast of Sivel's Bend in Cooke County. It is 390 ft. from the south line and 467 ft. from the west line of a 200-acre tract in the Solomon Gann Survey.

Ellis and Dubose field, Jack County, had 5 completions, Gatewood field, Cooke County 4 and Walnut Bend field, Cooke County, 3. Wichita County reported 11 field locations this week, Archer County, 9 and Young County 7.

In West Central Texas, Coleman County had 2 field completions this week and Jones, Shackelford and Taylor counties each had 1. Jones County Regular field reported 2 new field locations.

**NORTH CENTRAL TEXAS SUCCESSFUL WILDCAT COMPLETION**

Wichita County: Extension to old oil pool—W. H. Hammon and Hanlon-Buchanan 1 T. R. Boone, Sec. 1, Parker subd., SPRR Sur. A-264, 1½ mile NW Madden pool, elev. 1,021 ft., KMA 4,101 ft., flowed 1,223 bbl. day through ¾-in. choke, perf. 4,167-4,210, gravity 42, gas-oil ratio 200 to 1, TD 4,210 ft.

**NORTH CENTRAL TEXAS WILDCAT FAILURES**

Archer County: Bridwell Oil 1 Langford Investment, Sec. 127, J. W. Harris subd. Club Ranch, dry, TD 1,712 ft.

Carter & Winfrey 1 Jones & Cullum, Sec. 2, SPRR Sur. A-916, 4 mi. W and 1½ mi. S Holliday, dry, TD 1,659 ft.

T. V. Gorman 1 Lorena Kinder, Clark & Plumb Sur., Blk. 5, 1 mi. N and 5 mi. E Archer City, elev. 945 ft., dry, TD 1,285 ft.

T. V. Gorman 1 Lorena Kinder "Lot 59", Clark & Plumb Sur., Blk. 5, 1 mi. north and 5 mi. east Archer City, dry, TD 1,307 ft.

Frank Wood and A. R. Dillard 1 J. S. Melugin, Sec. 1, SPRR Sur., A-406, ¼ mi. SE Archer City, dry, TD 1,354 ft.

Clay County: Continental 1 W. D. Slaton, G. F. Lawrence Sur. A-229, 4 mi. E and 2 mi. N Joy, elev. 970 ft., Barnett 6,046 ft., Simpson 6,274 ft., Ellenburger 6,529 ft., dry, TD 6,708 ft.

Cooke County: S. D. Johnson 1 Mrs. M. E. Aldridge, Robt. Ekey Sur. A-356,


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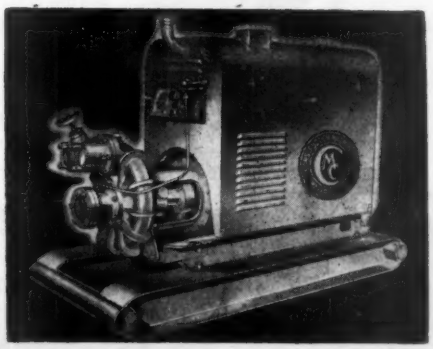

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Wichita County: Fain-McGaha 1 Geo. G. Adams, Sec. 37, H&GN Sur. A-162, 6 mi. W and 4 mi. N Wichita Falls, elev. 1,015 ft., Ellenburger 5,274 ft., dry, TD 5,305 ft.

**WEST CENTRAL TEXAS SUCCESSFUL WILDCAT**

Jones County: New oil pool—Crown Central Pet. Corp. 1 R. A. Stephenson, Lot 4, J. Winters Sur. No. 138, 1 mi. SW Hodges, elev. 1,730 ft., flowed 252 bbl. day through ¾-in. choke on 2-in. tubing, perf. 2,575-79 ft. Gunsight, gravity 43°, gas-oil ratio 250 to 1, TD 2,579 ft.

**WEST CENTRAL TEXAS WILDCAT FAILURE**

Coleman County: L. H. Choate 1 W. A. Powell, M. D. J. Trevine Sur. No. 668, 2 mi. E Coleman, elev. 1,628 ft., dry, TD 2,396 ft.

# PERMIAN BASIN

## Crane County Discovery To Be Dual Completion

MIDLAND.—Atlantic Refining Co. 1-A University, Section 33, Block 31, University Lands, opener of the Block 31 pool in east central Crane County, will be dually completed from the Devonian through perforations from 7,890-8,895 ft., and from the Ellenburger at 10,337 ft., through open hole. On a 1-hour drill-stem test from 10,337-427 ft. there was a steady blow of air throughout. Recovery was 4,555 ft. of fluid. All was oil and gas except the bottom two stands which was drilling mud heavily cut with oil and gas. Total depth is 10,431 ft. with elevation of 2,551 ft. Humble Oil & Refining Co. 1 G. H. Cowden, Section 35, Block 2, CCSD&-RGNG Survey, Ordovician wildcat 2 miles west of the shallow Crane-Cowden field in southeastern Crane County, was drilling below 7,371 ft. in lime and chert with no shows reported. Magnolia Petroleum Co. 1-B H. H. Tucker, Section 25, Block 1, H&TC Survey, wildcat 2½ miles northwest of the McKee pool, southwestern Crane County, with total depth of 5,187 ft., was shot from 5,785-5,811 ft. in the Simpson and swabbed 29 bbl. of oil in 15 hours.

Shell Oil Co., Inc., and The Texas Co. 1 Ratliff & Bedford, Section 4, Block 73, Public School Land Survey, southwestern Andrews County, discovery is being dually completed in the Devonian and Ellenburger. On latest test of the Devonian from 8,850-9,150 ft it flowed 446 bbl. of 38° gravity oil in 13 hours. Gas-oil ratio was 1,042 to 1. The well flowed 96 bbl. of oil in 1 hour in Ellenburger at 11,416 ft. Amerada Petroleum Corp. 1-A Dr. E. H. Jones, Section 3, Block A-6, Public School Land Survey, Devonian discovery in northwestern Gaines County 4½ miles southwest of the Wasson Field, recovered 22 bbl. of fluid, 15 to 40 per cent basic sediment and water, the remainder oil, during the first 4 hours of swabbing into storage from 11,268-84 ft. It has been perforated from 11,228-68 ft. to test the upper part of the formation.

Texas Gulf Production Co. 2 Allie Slaughter, League 113, Potter County School Land Survey, south offset to 1 Slaughter, southeastern Cochran County discovery 3 miles west of the Dean pool, was reacidized with 7,000 gal. from 5,010-63 ft. and swabbed and flowed 100 bbl. of oil in 10 hours. This showing was better than that of the discovery well from the same horizon. Gulf Oil Corp. 1 N. B. Hancock, Section 5, Block 1, Public School Land Survey, 1½ miles east and ½ mile north of Stanolind Oil & Gas Co. 1 J. F. Edwards, recent San Andres strike 10 miles west of the Slaughter pool, Cochran County, was drilling below 5,120 ft. with no shows reported.

Humble 1 Mrs. O. P. Buchanan, W. M. Baldridge Survey 32, Midland County wildcat 9 miles southeast of Midland, flowed acid water and gas after retreating with 1,000 gal. through perforations from 11,380-515 ft. Packer was reset at 11,300 ft. and water was being swabbed.

The Slaughter field, in Cochran and Hockley counties, had 5 completions this week; the Keystone-Ellenburger field, Winkler County, had 4; and the Fullerton field, Andrews County, had 3. The Keystone-Ellenburger field reported 4 new locations and the Howard-Glasscock field, Howard County, 3.

**WEST TEXAS WILDCAT FAILURES**

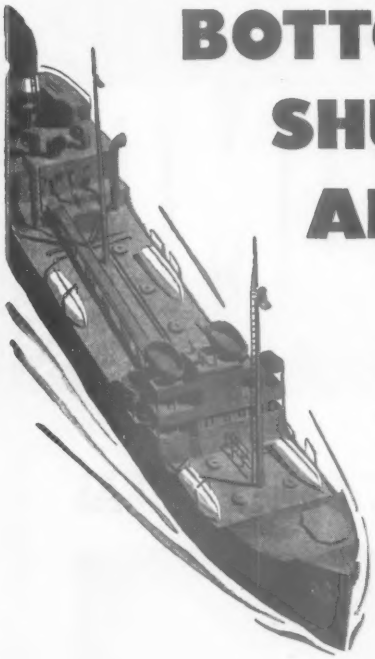
Andrews County: Magnolia 1 Lillian Stevens, Sec. 10, Blk. A-48, PSL Sur., 2 mi. W of SW side of Fullerton field, elev. 3,295 ft., Mississippian 8,520 ft., Woodford 8,655 ft., Devonian 8,870 ft., dry, TD 8,960 ft.

Crosby County: Geo. P. Livermore 1 Linnie Mae Wiese, Sec. 64, Blk. C, D&W Sur., 13 mi. NW Ralls, elev. 3,196 ft., Clear Fork 4,370 ft., Tubb 4,990 ft., dry, TD 8,517 ft.

Gaines County: Texas 1-B Parmer CSL, Labor 12, League 317 Parmer CSL Sur., 1 mi. N and 12 mi. SE cor. of county, elev. 3,080 ft., San Andres 5,070 ft., dry, TD 5,417 ft.

Garza County: Cherry & Kidd 1 Stoker, Sec. 8, Blk. 2, GH&H Sur., 1½ mi. S Garza field, elev. 2,547 ft., dry, TD 3,005 ft.

Howard County: C. W. Guthrie 1 Robt.

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C. Scott et al, Sec. 64, Blk. 29, W&NW Sur., 3 mi. NE Howard-Glasscock field, elev. 2,320 ft., Yates 1,235 ft., dry, TD 3,445 ft.

Runnels County: Callihan & Blakely 1 T. V. Jennings, E. Morris Sur. No. 332, 2½ mi. S Winters, elev. 1,768 ft., dry, TD 3,120 ft.

### SOUTHEASTERN NEW MEXICO

HOBBS.—Rowan Drilling Co. 1-B-15 Elliott, 15-20s-37e, scheduled Ellenburger test in southwestern Lea County, southeast of the Ellenburger discovery in the Penrose-Skelly area, flowed oil and gas for 15 minutes through the drill pipe when the testing tool was closed following a drill-stem test of the Holt zone of the Clear Fork from 5,078-5,160 ft. The tool was open 3 hours. Gas came to the surface in 11 minutes and there was a steady blow of air throughout the test. Operator was preparing to drill ahead.

Lea County had four field completions this week. Lea County reported four new field locations and Eddy County three.

### SOUTHEASTERN NEW MEXICO WILDCAT FAILURE

Lea County: Phillips 4 Leamex, 17-17s-33e, deep test in Maljamar field, elev. 4,214 ft., Glorietta 5,970 ft., Wolfcamp 10,970 ft., dry, TD 13,998 ft.

## EASTERN TEXAS

### Shelby County Test Has Good Show

DALLAS.—M. E. Davis and P. C. Benedum 1 Pickering, W. J. Brittain Survey, wildcat 6 miles east of Patroon in southeastern Shelby County, on a test from 5,780-95 ft. began flowing gas and wash water through ¼-in. tubing choke. At the end of 1 hour it showed 750 lb. flowing pressure and at the end of 16 hours 1,500 lb. pressure. Choke was changed to 3/16-in. and at the end of 8 hours flowing pressure was 1,450 lb. The gas had some distillate. Operators will squeeze and reperforate.

Jefferson Oil & Gasoline Co. 1 M. J. Whelan, George Gillespie Survey, wildcat west of Rodessa production in the Jefferson pool of southern Marion County, was flowing oil, gas and wash water into pits through perforations from 7,040-50 ft. No gage has been taken as it was allowed to clean itself. Humble Oil & Refining Co. 1 Geron, J. K. Rogers Survey, wildcat 3¼ miles west and slightly north of Talco, Franklin County, ran a 2-hour drill-stem test from 3,635-3,715 ft. and recovered 150 ft. of mud and 3,250 ft. of salt water. The Texas Co. 1 Ham, R. Lawson Survey, gas-distillate discovery 4 miles east and slightly south of Teague, Freestone County, was acidized through perforations from 7,980-8,018 ft. and tested 4,400,000 cu. ft. of gas, with 9 bbl. of 49° gravity distillate per million cubic feet of gas through ¼-in. choke. It is waiting on official test.

**Smith County**— Phillips Petroleum Co. 1 Craver, east offset to the discovery in the South Tyler field, reperforated with 20 shots, kicked off and flowed 324 bbl. of 39.4° oil in 19 hours. Total depth is 9,999 ft. It was still testing. Phillips 1 Hairston-Johnson, J. Hope Survey, South Tyler field, while testing at total depth of 9,984 ft. showed an average of 180 bbl. of 49° oil in 24 hours. Phillips 1 Englander, Thomas Quevado Survey, 4 miles southwest of the South Tyler field, was drilling below 12,710 ft. in sand and shale.

Quitman field, Wood County, and Hen-

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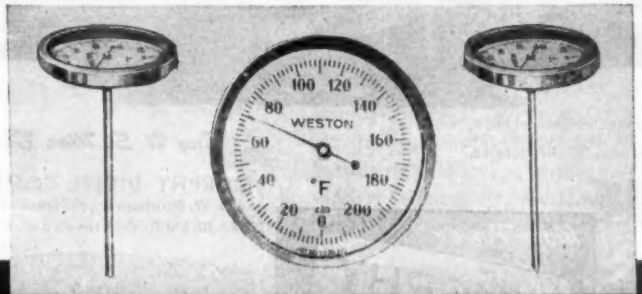


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derson field, Rusk County, each had one completion this week. Carthage field, Panola County, reported four new locations.

**EASTERN TEXAS SUCCESSFUL WILDCAT**

Harrison County: New gas pool—Rogers Lacy 1 Mrs. E. L. Peteet, Betty Humphries Sur., 3 mi. N Harleton, elev. 332 ft., flowed 57 mil. cu. ft. gas day open flow, perf. 6,830-42 ft. Rodessa, rock pressure 2,750 lb., flowed 2 mil. cu. ft. gas open flow at 7,358 ft. Travis Peak, rock pressure 2,900 lb., TD 7,507 ft.

**EASTERN TEXAS WILDCAT FAILURES**

Leon County: Claude Reed 1 Rex Reed, Thos. H. Garner Sur., 4 mi. SE Flynn, elev. 412 ft., Wilcox 944 ft., dry, TD 1,003 ft.

Shell and Lone Star 1 Tandy (Flank), W. Martin Sur. A-607, deep test in Buffalo pool, 12 mi. N and slightly E Centerville, elev. 391 ft., Woodbine 5,630 ft., Travis Peak 10,050 ft., plugged back to 5,791 ft., flowed 100 mil. cu. ft. gas with some distillate in regular pay. TD 10,802 ft.

# CALIFORNIA

## Three Key Wildcats Being Prepared for Tests

LOS ANGELES. — Three outstanding wildcats, Standard's 1 Lewis Comm. at Leffingwell, Ohio's 1 Gardena Comm. at Gardena, and Tide Water Associated's 82-15 S. P. at Cantua, are being prepared for production tests, the outcome of which may be known soon. Standard and Ohio have encountered some water trouble but this is thought to be of a mechanical nature and subject to corrective work.

Standard drilled its Lewis wildcat to 10,635 ft., then plugged back to 10,400 ft. A string of 7-in. casing was cemented some time ago at 10,145 ft. following which an additional 490 ft. of hole was made. If Standard's problem is bottom water, the plug may solve the difficulty which has held up a production test for several days.

Ohio's problem at Gardena where a discovery was made several weeks ago appears to be a difficult one and it may take another hole to determine the area's possibilities. The well showed a favorable initial production for a day, but inability to get this well on production again has created some doubts. The test shows plenty of oil with enough gas volume and pressure to flow and the only thing that has held up completion is the high water cut. The liner has been squeezed so many times that a successful completion now would be unusual. Ohio has continued work, however, and is now prepared for another test.

Tide Water Associated's Cantua wildcat in Fresno County is being plugged back and will test by stages. With bottom at 12,920 ft., an electric log was run to 12,675 ft. and it was decided to plug and test This wildcat showed exceptionally high

(Continued on page 147)

# KANSAS

## Clark, Meade, Russell Counties Get Discoveries

SUCCESSFUL wildcats highlighted this week in Kansas, with two oil discoveries and one gas discovery testing. Stanolind Oil and Gas Co. 1 Adams, SW SW SW 7-35-29w, five miles east of the Adams Ranch gas discovery well of this year, is swabbing 17 bbl. of 19.2-gravity oil per hour. Successful completion of this well will give Meade County its first oil pool. Lansing was topped at 4,268 ft. and the Mississippi lime cut at 5,845 ft. After drilling to a total depth of 6,338 ft., operators plugged back, set packer at 6,200 ft., acidized and swabbed.

In Clark County, Helmerich & Payne 1 Peter estate, NW NW SE 3-31-21w, 10 miles northeast of the abandoned Morrison pool, received an estimated 10,000,000 cu. ft. of gas from a drill-stem test at 5,174-90 ft. in the Mississippi. Operators are now running Schlumberger.

Skelly Oil Co. 1 Schulte, NE SW NW 20-13-15w, a Russell County wildcat between Fairport and Gorham pools, is pumping oil from the Lansing. Lansing was cut at 3,029 ft., and Arbuckle at 3,289 ft. Water was found in the Arbuckle, and operators plugged back and perforated at 3,023-43 ft. After acid, the well pumped 53 bbl. oil and 85 bbl. water in 17 hours.

**KANSAS SUCCESSFUL WILDCAT**

Pawnee County: New oil pool—Stanolind and Skelly 1 Benson, CNL NE NW 30-23-15w, physical potential 357 bbl. from Lansing-Kansas City at 3,703-3,869 ft., TD 4,165 ft., Kansas City 3,626 ft., Marmaton 3,948 ft., Simpson 4,030 ft., Arbuckle 4,064 ft.

**KANSAS WILDCAT FAILURES**

Barton County: Chalmette Petroleum 1 Ochs, SW SE NW 20-16-14w, dry, TD 3,526 ft., Arbuckle 3,481 ft.

Butler County: S. & L. Drilling 1 Criner, NW SW NE 34-26-6e, dry, TD 3,222 ft., Viola 3,220 ft.

Dickinson County: Nelson Drilling et al 1 White, SW NW NW 7-15-1e, dry, TD 2,647 ft., Mississippi chat 2,602 ft.

Graham County: Barnsdall et al 1 Roberts.


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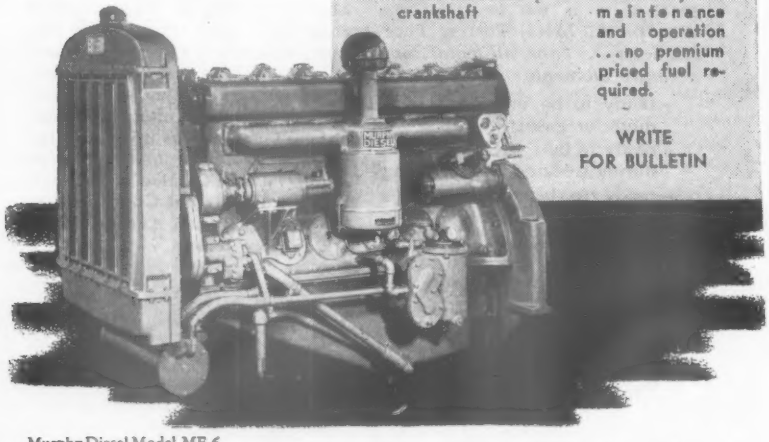

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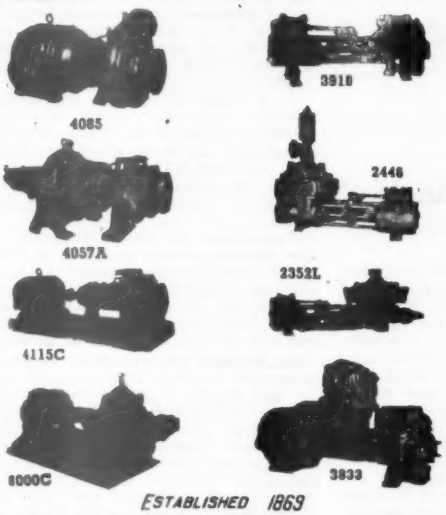


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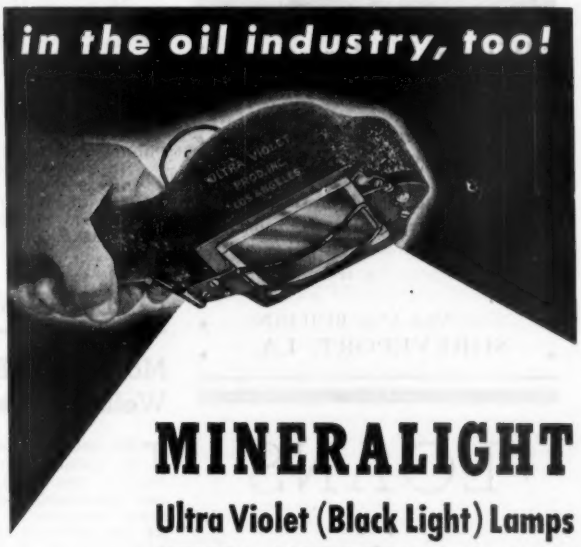


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Marion County: Ward McGinnis 1 Loveless, NW SW 2-19-4e, dry, TD 2,669 ft., Viola 2,664 ft.

McPherson County: Nelson Drilling 1 Sinclair, SW SW SW 25-19-1w, dry, TD 3,420 ft., Viola 3,387 ft.

Phillips County: Denver Oil 1 Muellar, NE SW SE 9-3-19w, dry, TD 3,575 ft., Arbuckle 3,548 ft.

Thomas County: Texas 1 McArthur, SE NE SW 18-8-36w, dry, TD 5,372 ft., Arbuckle 5,263 ft.

# OKLAHOMA

## More Good Booch Sand Wells in Cheyarka

THE Cheyarka pool in Seminole County, opened by Gulf Oil Corp. in January of 1944 in 28-10n-7e, with a Booch sand producer, and brought into prominence recently by Ilco Corp. 1 Allred, NE NE NW 8-9n-7e, with an initial production of 960 bbl. from Booch sand, had two good completions in the past week. Ashland Oil & Refining Co. 1 Landowners Royalty Co., NE NW NW 8-9n-7e, is a 600-bbl. well from Booch sand at 3,556-68 ft. Ilco Corp. 2 Allred, SE NE NW 8-9n-7e, with Booch sand at 3,528-55 ft., was shot with 80 qt. at 3,535-63 ft., and flowed 20 bbl. per hour through casing. There are 42 oil wells and 5 gas wells in the pool and 13 locations and drilling wells, mostly recent starts.

Harper & Turner et al 1 Whitt, NE NE NE 24-12n-2w, about 6 miles east of the north end of the Oklahoma City pool, made a drill-stem test of Bartlesville sand at 6,142-68 ft. and recovered 30 ft. of slightly oil and gas-cut mud. It was given up as dry, total depth 6,462 ft.

The Texas Co. 1 Holt, NE NE SE 8-1n-19w, Jackson County, total depth 2,976 ft., had plug set at 1,490 ft. and pipe perforated at 1,419-33 ft. It pumped 84 bbl. of oil and 9½ bbl. of water the first 24 hours and later 59 bbl. of oil and 15 bbl. of water in 24 hours.

Pure Oil Co. 1 Central Life-B, SW SE SW 23-3s-1e, Carter County, a couple of miles northwest of Ardmore, was drilled to 5,532 ft. in Bromide topped at 4,900 ft. It tested salt water. It was plugged back to 4,050 ft. and made a gas well good for 7,800,000 cu. ft. per day.

J. E. Trigg 1 Tennery, C NE SW 22-13n-7w, Canadian County wildcat, was drilling at 10,715 ft. First Wilcox was penetrated at 10,430-40 ft. A drill-stem test at 10,583-645 ft. developed a 2,000,000-cu. ft. gas production, no oil, but no water. It is northeast of the city of Reno.

Continental Oil Co. 1 Butterfly, southern Garvin County wildcat, in NW SW SE 14-1n-1e, which showed for a small well in Arbuckle lime, was plugged back to the Oil Creek sand and perforated with 196 shots at 3,963-4,067 ft. It swabbed 150 bbl. of 17-gravity oil in 5 hours.

**OKLAHOMA SUCCESSFUL WILDCATS**

Kingfisher County: New oil pool—Phillips and Carter 1 Jirick, SW SW 26-16n-5w, flowed 153 bbl. in 24 hours from Hunton at 7,064-95 ft., TD 7,393 ft. Hunton 7,064 ft., Harrington 7,087 ft., Chimney Hill 7,190 ft., Sylvan 7,330 ft.

Oklahoma County: New oil pool — Ace Gutowsky 1 Crum, NW NW SE 24-13n-3w, pumped 120 bbl. from Cleveland at 5,274-31 ft., TD 6,949 ft., Cleveland 5,700 ft., Oswego 5,992 ft., Bartlesville 6,264 ft., second Wilcox 6,915 ft.

Osage County: New pay in Blackdog, West Pool—Wilcox No. 2, NE SE NW 15-22n-8e, flowed 550 bbl. from Arbuckle at 2,793-2,817 ft., TD 2,817 ft., May 2,491 ft., Arbuckle 2,795 ft.

Pontotoc County: New pay in East Ada district—Ashland 1 Hales, NE NE NW 11-4n-7e, flowed 18 bbl. from Gilcrease at 2,051-62 ft. TD 2,062 ft., Booch 1,860 ft., Gilcrease 2,051 ft.

Stephens County: Extension to Scholem Alechem pool—Daube and Atlantic 1 Layn, NW NW SW 1-1s-4w, pumped 30 bbl. of 31-gravity oil from Pennsylvanian sand at 3,194-3,463 ft., TD 4,510 ft.

**OKLAHOMA WILDCAT FAILURES**

Garvin County: Summit Drilling et al 1 Wigley, NW SW NE 11-4n-1w, dry, TD 5,585 ft., Bromide 5,355 ft.

Lincoln County: Fred Morgan 1 Cull, SE SW SE 17-14n-4e, dry, TD 5,032 ft., second Wilcox 5,002 ft.

Okfuskee County: Sunray 1 Marion, NW NW SE 5-10n-9e, dry, TD 4,081 ft., Sylvan 4,067 ft.

Osage County: Ashland No. 1, SE SE NW 1-24n-8e, dry, TD 2,814 ft., Arbuckle 2,785 ft.

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A Technical Bulletin
by
Carl D. Miller, Ph. D.
*Send for free copy*
The Andover Press
Andover, Mass.

Seminole County: Sohio 1 Varnum, NE NE NE 36-9n-7e, dry, TD 3,505 ft., Cromwell 3,477 ft.

Tillman County: Bridwell Oil & Gas 1 Storm, NE NE 23-1s-19w, dry, TD 5,263 ft., Arbuckle dolomite 5,180 ft.

# ROCKY MOUNTAIN

## Interior Big Horn Basin Test Looks Promising

DENVER.—Favorable indications of a major discovery on the River Dome, Washakie County, Wyoming, in Pure Oil Co. 1 Unit, NE NE NW 18-48n-92w, was the outstanding development of the week in the Rocky Mountain area. This wildcat may result in developments much more important than merely opening a new oil or gas pool because of its strategic location within the Big Horn Basin. It had the top of the Torchlight (first Frontier) sand at 7,133 ft., and the "A" or second sand at 7,242 ft. It cored saturation from 7,242 ft. to 7,310 ft., and then a drill-stem test was taken at 7,229-72 ft. With the valve open 8 minutes it flowed gas at the rate of 5,000,000 cu. ft. per day through a ¼-in. choke on the 4½-in. drill pipe. During the test there was recovered 47 ft. of 54° gravity distillate. The flow of gas increased rapidly during the test. The flowing pressure was 2,800 lb. psi. The shut-in bottom-hole pressure rapidly built up to 3,800 lb. Following this test drilling was resumed with the intentions of coring and testing the Peay (lower Frontier), then ream and run a protective string of 9⅝-in. through the sands before drilling deeper. It will go, if necessary, to 13,000 ft. in order to test the Embar-Tensleep series.

The important feature of this wildcat is that it is well out in the enormous Big Horn basin. Around the rim of this sedimentary basin are located such fields as Elk Basin, Frannie, Garland, Byron, and others. With the exception of Badger Basin, which lies near the northwestern rim west of Elk Basin, where the Frontier is picked up at around 8,500 ft., the interior of this sedimentary basin is practically virgin territory. The Pure's test is in the southeastern part of the basin, 12 to 14 miles west of Hidden Dome, the nearest rim structure on the east, and 45 miles east of Little Buffalo Basin, the nearest rim structure on the west. From Badger Basin on the north to Zimmerman Butte on the south is approximately 100 miles. The nearest producing field on the southwest is Gebo, a distance of 35 miles. On the theory that this immense area contains buried interior basin structures, extensive geophysical surveys have been made in the past 2 years, large blocks have been leased. (See The Oil and Gas Journal 3/10/45, p. 41 and 3/17/45, p. 58). Should the Pure company's test prove this theory, it may lead to extensive exploration drilling in one of the largest potential areas in the Rocky Mountain district.

**New operations.**—Fourteen new operations were reported, 6 in Wyoming, 1 in Colorado, 6 in Montana, and 1 in northwest New Mexico. Of these, three were wildcats, one on Neiber dome in Wyoming, one at Saratoga, Carbon County, in that state, and one in northwest New Mexico. The latter is Continental Oil Co. 2 Dyke, NW NW SE 36-29n-18w, San Juan County, testing possibilities of an oil trap near Shiprock dyke, 4½ miles north of a similar test recently abandoned.

**Completions.**—Twelve wells were completed, of which 2 were dry holes and 10 were producers, with initial production of 2,130 bbl. These were distributed: Colorado, one; Wyoming, five; Montana, six. The two dry holes were wildcats at South Elk Basin, Wyo., and Big Timber, Mont.

**MONTANA WILDCAT FAILURE**

Sweetgrass County, Big Timber: Stanolind Oil & Gas Co. 1 Rapstad, SE SE SW 31-2n-15e, TD 6,351 ft., dry and abd.

**WYOMING WILDCAT FAILURE**

Park County, South Elk Basin: Union Oil Co. 1 Taggart-Kendall, SW NW NW 28-57n-99w, TD 3,170 ft., in top of Eagle sandstone, ran 1,300 ft. low on Eagle, plugged and abandoned.

# OHIO, KENTUCKY

## Large Clinton Gas Well Completed in Muskingum

COLUMBUS.—Industrial Gas Co. 1 Barricklow-Siler, Section 16, Blue Rock Township, Muskingum County, gaged 4,917,000 cu. ft. in the Clinton sand at 4,350-4,382 ft., the largest gas well yet found in the township. The majority of the wells are producers in the Medina sand 100 ft. below the Clinton.

Eleven locations were reported this week with 5 in Brush Creek Field. Of the 27 completions, Ashland-Lorain led with 6.

**OHIO WILDCAT FAILURES**

Columbiana County, Knox Township: E. Jordon et al 1 Hummel-Stroup, Section 28, Oriskany 3,644-55 ft., dry, TD 3,660 ft.

Coshocton County, Monroe Township: Wiser Oil 1 Floyd Ling, Section 28, Clinton 3,177-3,202 ft., dry, TD 3,246 ft.

Mahoning County, Smith Township: Ohio Oil 1 J. & C. Werren, Section 13, Oriskany 3,428-45 ft., dry, Clinton 5,098-5,136 ft., dry, TD 5,298 ft.

Ross County, Concord Township: Kissling Drilling 1 Walter Perie, D-3, Lime 135-535 ft., Medina 633-635 ft., Trenton 1,630-2,240 ft., St. Peter 2,270-2,325 ft., dry, TD 2,325 ft.

Wayne County, Franklin Township: Ohio Oil 1 D. W. Foster, Section 24, Clinton 3,653-77 ft., 3,690-3,717 ft., show gas, shot, plugged, TD 3,846 ft.

**WESTERN KENTUCKY**

OWENSBORO.—Sun Oil Co. 1 Fannie Pritchett, in 21-O-22, Dixie pool, Henderson County, was the only sizable completion of the week in western Kentucky, but Carter Oil Co. 2 O'Nan, a near completion in the same pool and same section, swabbed 552 bbl. in a 24-hour test of Cypress sand at 2,297-2,305 ft. It had not been shot. The Sun's well on the Pritchett farm produced from the Cypress sand at 2,260-74 ft. and flowed 324 bbl. in 24 hours without a shot. No wildcat wells were completed.

**EASTERN KENTUCKY**

ASHLAND.—Luscon Oil Co. completed a 20-bbl. well at 1,225 ft. on the M. F. Allen farm near Lower Devils Creek, Wolfe County, 6 miles southeast of Campton near the Lea County line.

Ashland Oil & Refining Co. No. 10 Northcutt (1,000-acre tract), Menifee County, is rated a 10-bbl. well at 723 ft. Ashland's No. 715 on the Northcutt (160-acre tract) was dry at 721 ft. Same company's T. K. Murphy 1, Morgan County, is dry at 1,340 ft. In Elliott County, Ashland's No. 4 on J. H. Fraley Tract 2 is good for 5 bbl. at 865 ft.

**INDIANA**

EVANSVILLE.—Deep Vein Coal Co. 1 fee, NE NE SE 1-2s-12w, Gibson County, Indiana, a wildcat about 4 miles southeast of Mt. Carmel, Ill., was being tested in saturated Benoist sand at 2,124-38 ft. A drill-stem test of 1 hour yielded 330 ft. of clean oil and 60 ft. of oil-cut mud. It is 2 miles from production.

**INDIANA WILDCAT FAILURE**

Jackson County: George B. McCamey et al 1 O. L. Stevenson, SW SW SW 21-4n-6w, dry at about 1,650 ft.

# MISSISSIPPI

## Adams County Test Preparing to Drill-Stem

JACKSON.—Charles H. Osmond 1 Armstrong-Ellislie, 1,129 ft. north and 54 ft. west of the NE cor. of fractional section 31-5n-2w, in Adams County, possible pool opener, is preparing to take a drill-stem test through 2-in. tubing. One previous drill-stem test, taken at 10,268 ft., failed. Oil shows were found in the Wilcox, and gas-condensate shows in the Massive sand. Operators have run tubing to bottom to condition the hole, and will perforate 5½-in. casing to take the test.

Mississippi fields gained seven oil wells during the week, with Langsdale field taking the lead with five of them. Only one wildcat was completed. Six new locations were announced this week, two of them being wildcats, one to be drilled in Chickasaw County, and the other scheduled for Copiah County.

**MISSISSIPPI WILDCAT FAILURE**

Hinds County: Huckleberry & Cline 1 School Lands, NW NW 16-6n-1w, dry, TD 4,059 ft., Comanche 3,730 ft.

**ALABAMA SUCCESSFUL WILDCAT**

Choctaw County: Extension to Gilbertown Pool—Carter 1 Alman, 300 ft., north 398 ft. east of SW cor. of NE SW 5-10n-3w, pumped off after pumping 14 bbl. of 17.5-gravity oil in 6 hours. Will probably rework later. TD 3,461 ft., producing from Eutaw from 3,336-3,401 ft.

**ALABAMA WILDCAT FAILURE**

Washington County: Wayne Refining 1 Mitchell, approx. NW NW NE 12-8n-3w, dry, TD 5,527 ft., Eutaw 3,323 ft.

# CALENDAR

**October**

California Natural Gasoline Association, fall meeting, Biltmore Hotel, Los Angeles, October 12.

I.P.A.A., annual membership meeting, Tulsa, October 14-17.

American Gas Association, annual meeting, Engineering Societies Building, New York, October 24-25.

**November**

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 12-15.

Independent Natural Gas Association of America, annual membership meeting, Dallas, November 26.

**December**

Michigan Oil and Gas Association, annual meeting, Mt. Pleasant, December 3.

**(1946)**

**April**

Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas, April 17-19.

**May**

National Association of Corrosion Engineers, annual meeting, President Hotel, Kansas City, Mo., May 7-9.

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# Among the Drilling Contractors

**Olson Drilling Co.** is erecting derrick at a wildcat test 6 miles north of the northwest tip of the Burbank pool in northeastern Kay County, Oklahoma. The test is the 1 Gowey, in NE NE SW 7-28n-5e. It will penetrate the Bartlesville sand at approximately 3,200 ft.

**Brown & Eakle,** Carmi, Ill., has contract to drill the Phillips Petroleum Co. 5 Delilah, in SW SW SE 6-2n-10e, in Richland County, Illinois.

**K. de K. Drilling Co.,** of Vermilion, Alta., has finished El Lee 1, LSD 1, 13-49-1w4, in the Lloydminster field, at 1,903 ft. Testing is in progress while the company is starting on contract for El Lee 2, LSD 2, same section.

**Turner Drilling Corp.** has the contract for the Pure Oil Co. 1 Freer, in N/2 NW SW 18-17n-6w, Clare County, Michigan.

**Delta Drilling Co.,** Evansville, Ind., is moving in tools to drill the C. Wood 1 Raber, a wildcat in SE SE SE 7-2s-13w, Wabash County, Illinois.

**Roy Fisher** has the contract to drill the S. H. Caudelet 1 Boykin, a wildcat in S/2 NE SE 25-2n-1e, Mobile County, Alabama.

**Johnston & Parks Drilling Co.** is preparing to spud on the Sohio Petroleum Co. B-9 Brumfield, 424 ft. south and west of NE corner of NW SW 1-10n-3w, a Tinsley pool well in Yazoo County, Mississippi.

**E. O. Olds,** Mt. Carmel, Ill., is the contractor for Aetna Oil Co. 1 Travers, NW SW SE 27-1n-9e, Wayne County, Illinois.

**Crow Drilling Co.** is moving in materials for the Carter Oil Co. 1 Sam Alman Unit, in SW SE NE 5-10n-3w, in the Gilbertown field of Choctaw County, Alabama.

**Gilbert P. Shoultz,** Francisco, Ind., will drill the R. D. Brown, Inc. 1 Dawson heirs, 990 ft. from the south and 330 ft. from the east lines of SE NW 17-1s-9w, Gibson County, Indiana.

**Conway Drilling Co.** will drill the Kirby Petroleum Co. F-2 Long Bell Petroleum Co., 330 ft. from south line of 30-1n-18e, in the Langsdale field of Clarke County, Mississippi.

**Hayes Drilling Co.,** Mt. Carmel, Ill., is the contractor for Ryan Oil Co. 1 Kries, in NW SE SE 8-3s-13w, Gibson County, Indiana.

**Danciger Oil Co.** is the contractor for Gulf Refining Co. 3 Armstrong, in NE NE SW 19-1n-13e, East Heidelberg field, Jasper County, Mississippi.

**George W. Miller,** Mt. Carmel, Ill., is the contractor for Ben Duncan 1 Miller, in NW SW 18-9n-5w, Owen County, Indiana.

**Cook Drilling Co.** has the contract to work over the Sun Oil Co. 2 Hammett, in the Bruinsburg field of Claiborne County, Mississippi.

**Muskegon Development Co.** is the contractor for Gulf Refining Co. 1 Wiedyd, in NE SW SE 16-14n-6e, in the Essexville pool of Bay County, Michigan.

**Goll, Graves & Mechling** has the contract for three new wells to be drilled in the Deep River field of Arenac County, Michigan. The lo-


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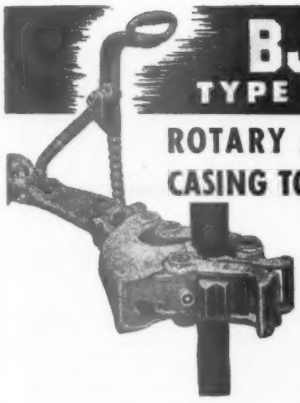

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## California Fields

(Continued from page 142)

gas pressure higher up in the hole and this upper zone may prove productive of either gas or oil and gas. It was adequately mudded off during drilling operations and kept under control with weight material but apparently was not tested.

Richfield Oil Corp. finished an excellent flowing well in the Santiago section of the Midway-Sunset area and proved that Gulf's discovery well had found a highly productive sand. Texas Co. has a well headed down to the Western Gulf sand and should be ready for a production test within another week.

Locations made in California during the past week were below completions and as this condition has existed for some time the trend appears to indicate a slight reduction in drilling during the remainder of the year. It is still too early, however, to form a definite opinion due to labor unrest and the imminence of extensive strikes.

**CALIFORNIA SUCCESSFUL WILDCAT**

Los Angeles County, Simi: Union Oil 5 Simi, 22-3n-17w, pumped 11 bbl., 27.2° gravity, 0.4 per cent cut, TD 1,034 ft., perf. 695-1,034 ft., Sespe sand of Miocene age.

**CALIFORNIA WILDCAT FAILURES**

Fresno County, Irvine Ranch: Union 65-13 Irvine, 13-13s-12e, dry, abandoned in gray sand. Kreyenhagen 3,215 ft., Domengine 3,845 ft., Martinez sand 4,088 ft., Dos Palos sand 4,387 ft., Jergins sand equivalent 6,576 ft., TD 6,829 ft.

Kern County, East Bakersfield: E. A. Bender 1 Williams, 32-29s-28e, dry, bottomed in hard gray sand, silt 4,286 ft., no important showings, TD 4,289 ft.

Gosford: Rothschild Oil 83-13 Kern County Land, 13-30s-26e, dry, bottomed in barren gray sand. Stevens sand of Miocene age barren at 6,950 ft., no important showings, TD 7,495 ft.

Ventura County, Fillmore: Perkins, Wileman & Couget 1 Fillmore, 26-4n-20w, dry, bottomed in Saugus gray sand. No important showings, TD 1,532 ft.


**Statement of the Ownership, Management, Etc., of**

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Known bondholders, mortgagees and other security holders holding 1 per cent or more of the total amount of bonds, mortgages or other securities: None.

S. H. ROURKE,
Business Manager.

Sworn to and subscribed before me this 28th day of September, 1945.

JOHN P. GALLAGHER,
Notary Public.

My commission expires March 1, 1947.



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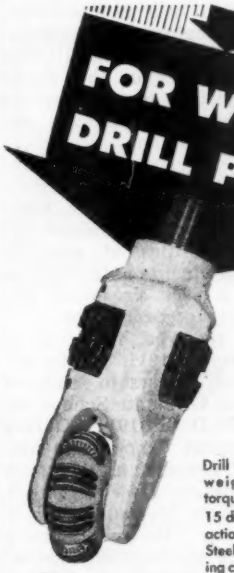

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Steel ball and roller bearing construction through all moving parts.

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# PERSONALS

## New Ohio Director Has Charge of Production

DR. WILSON B. EMERY, recently made a director of The Ohio Oil Co., has complete charge of all its production operations. He joined the company in 1919 as a geologist in Wyoming. Beginning in 1926 and continuing until 1938, he directed geological activities in the Rocky Mountain division, besides serving as assistant division manager and division superintendent.

In 1939 Dr. Emery was appointed chief geologist and transferred to the general office in Findlay, Ohio. Four years later he assumed the added responsibilities of assistant manager of production. In 1944 he was elected a vice president and named manager of production.

Dr. Emery received his A. B. at Yale University in 1911, and he devoted the next 3 years to study of geology at Yale Graduate School, receiving his Ph.D. in 1914. During this time he spent 7 months in topographic and geologic mapping on the Navajo Indian Reservation in Arizona and New Mexico for U. S. Geologic Survey. He served as a member of the production committee of District 2, Petroleum Administration for War.

**A. B. Van Tine,** formerly a member of Gulf Oil Corp.'s geological staff in Fort Worth, has been transferred to the Midland, Tex., district office. He is a Colorado School of Mines graduate.

**W. O. Wilson,** formerly assistant manager of Standard Oil Co. of Indiana's safety department, has been promoted to manager. He succeeds **C. W. Smith,** who retired. Wilson began work for the company in 1925, at the Whiting, Ind., refinery, and entered safety work 2 years later.

**Dr. Glenn G. Bartle,** natural-gas geologist, has joined the New York staff of E. Holley Poe and Associates, natural-gas consultants. Dr. Bartle was released from the Navy recently after serving as commanding officer of the V-12 unit at Swarthmore College. Previously he had organized the courses of instruction in the Navy's antiaircraft schools throughout the country. During the 9 years preceding his induction into the Navy in 1942, Dr. Bartle was on the faculty of University of Kansas City, where he organized the geology department.

**Mario J. Cueto,** manager of the Buenos Aires office of Reed Roller Bit Co., his district comprising Argentina, Brazil, Chile, Paraguay, and Bolivia, arrived in New York September 24 and attended the drilling contractors' convention in Oklahoma City this week. He will visit oil and gas fields of the Mid-Continent, Gulf Coast, and California to study developments in drilling and producing operations before returning to Argentina.

**W. F. Smiley,** for the past 17 years city editor of the Athens (Ohio) Messenger and instructor in the school of journalism at Ohio University, of which he is a graduate, has joined Ohio Fuel Gas Co. as publicity director, with headquarters in Columbus.

**Miss Muriel E. Reynolds** and **Mrs. Margery M. Porter** have been appointed assistant secretaries of Standard Oil Co. (N.J.), the first women to become corporate officers of that organization. Both started as stenographers, serving in various departments before their selection to be assistants to **A. C. Minton,** secretary of the company.

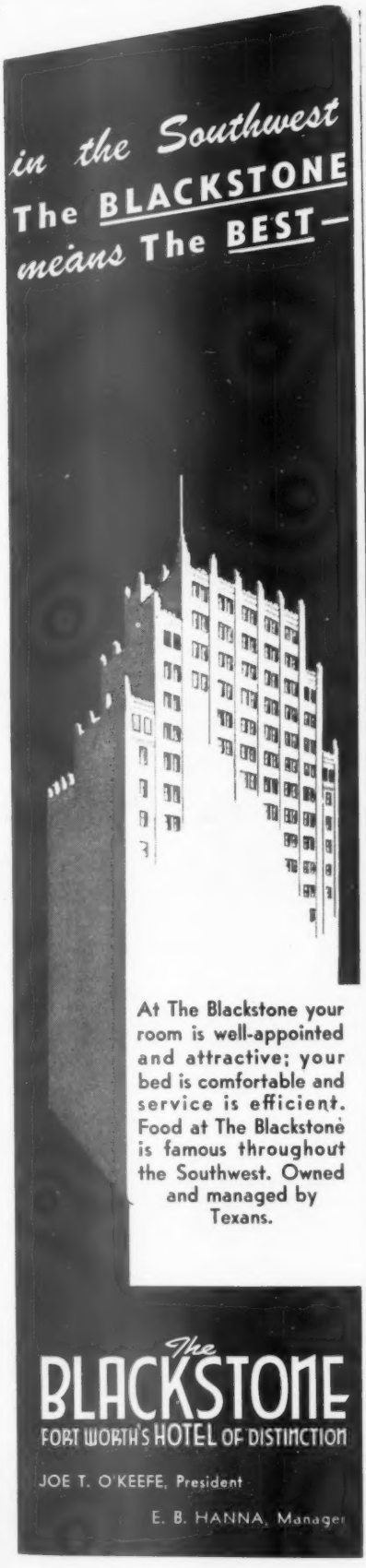
**Richard D. Buck,** Schlumberger Well Surveying Corp., was elected president of Shawnee Geological Society for the ensuing year. **Delbert F. Smith,** Oklahoma Seismograph Co., was chosen vice president, and **Marcelle Mousley,** The Atlantic Refining Co., secretary-treasurer.

**Arthur O. Smith,** widely known in the public-relations field, has been named publicity director of the industrial and commercial gas section, American Gas Association. He will reestablish the service for technical and business magazines which was carried on for years before the war. Smith at one time was a partner in an advertising agency. Later he was advertising manager of The Commonwealth & Southern Corp., then was with Charles & Co.

**Herbert Willetts** has been appointed general manager of the eastern marketing division of Socony-Vacuum Oil Co., Inc., succeeding **John M. Martin,** who, after 42 years of service, will retire. He had been assistant general manager. Willetts joined Socony-Vacuum after graduating from Union College in 1923.

**Arthur F. Corwin,** vice president, director, and member of the executive committee of Socony-Vacuum Oil Co., Inc., retired October 1. He was in charge of crude-oil production. Corwin entered the oil business in the fields of Pennsylvania and West Virginia. He became president of The Carter Oil Co. in 1915 and remained with that company till 1926, when he was made a director of Standard Oil Co. of New York and then of Socony-Vacuum, its successor, in 1932.

**A. Denys Cadman** has been appointed regional sales manager for the Quebec-Maritime divisions of British American Oil Co., with headquarters at Montreal. Cadman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JOE T. O'KEEFE, President
E. B. HANNA, Manager


was active in exploration and drilling before entering the marketing branch of the petroleum business in 1933.

**Richard Fenton,** executive vice president of California Stripper Well Association, has been appointed a member of National Crude Oil Advisory Committee of Office of Price Administration. Fenton is chairman of the California stripper well advisory committee of OPA and was formerly vice president of National Stripper Well Association, a member of the advisory board, American Petroleum Institute, and vice chairman of the Conservation Committee of California Oil Producers.

## LEGAL

### OIL AND GAS LEASE

UNITED STATES DEPARTMENT OF AGRICULTURE, Forest Service, Jackson, Mississippi, September 22, 1945. Sealed bids in duplicate will be received until 10:00 A. M., Central Time, October 23, 1945, then publicly opened, offering bonus for operating rights in connection with gas and oil leases on four blocks of national forest land which are divided into eleven parcels, located in Adams and Franklin Counties, Mississippi. Block number one contains Parcel A of approximately 163.70 acres, more or less, in Township 5 North, Range 2 East, Section 17, E½ E½. Parcel B of approximately 655.03 acres, more or less, in Township 5 North, Range 2 East, Section 20, entire. Parcel C of approximately 622.73 acres, more or less, in Township 5 North, Range 2 East, Section 30, entire, except ½ acre graveyard in SE¼ NE¼. Block number two contains Parcel A of approximately 617.93 acres, more or less, in Township 5 North, Range 2 East, Section 21, W½, SE¼, S½ NE¼, and NW¼ NE¼. Parcel B of approximately 438.67 acres, more or less, in Township 5 North, Range 2 East, Section 22, S½ SW¼, NW¼ SW¼; Section 29, W½ NW¼, E½ E½ and W½ NE¼ except 10 acres of even width across the south side. Parcel C of approximately 322.83 acres, more or less, in Township 5 North, Range 2 East, Section 28, W½. Block number three contains Parcel A of approximately 400.68 acres, more or less, in Township 5 North, Range 2 East, Section 31, S½, and E½ NE¼. Parcel B of approximately 468.06 acres, more or less, in Township 5 North, Range 2 East, Section 32, N½ NW¼, SW¼ NE¼, SE¼ NE¼, NE¼ SE¼; Section 33, NW¼ W½ NE¼, NW¼ SW¼. Block number four contains Parcel A of approximately 1271.64 acres, more or less, in Township 5 North, Range 1 West, Section 31, entire. Parcel B of approximately 432.93 acres, more or less, in Township 5 North, Range 1 West, all of Section 32 West of Levees Creek, all of Section 33 West and South of Levees Creek. Parcel C of approximately 308.98 acres, more or less, in Township 5 North, Range 1 West, all of Section 34 except a triangular shape lot off the west side thereof South of Wells Creek; Section 49, entire; and a triangular shaped lot off the East side of the Southern portion of Section 58. Bids may be submitted for an entire block or separately for any or all parcels thereof, or in both ways. If the aggregate of the several high bids on the individual parcels of a specific block exceeds the maximum bid for the block as an entirety, the bids on the parcels will be accepted. If, however, a bid on a block as an entirety is higher than the aggregate of the high bids on the several parcels thereof, then the bid on the entire block will be accepted. Award of lease will be made only to bidder who can show sufficient experience and financial resources and prove citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the Forest Supervisor, Masonic Building, U. S. Forest Service, Jackson 114, Mississippi.


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NOW BACK IN FULL PRODUCTION after two years' "layoff" because of war work, these oil-proof, wear-resistant, plastic rings hydraulically pressed on all sizes of tubing collars prevent the collar-to-tubing contact that causes many expensive "wet jobs" in pumping wells.

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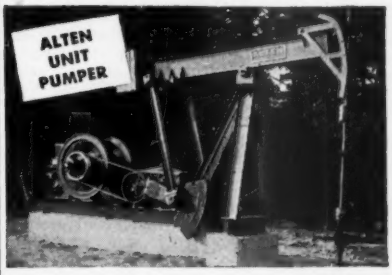


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# Equipment Men in News

The appointment of **Norman Wunderlich** as executive sales director of radio equipment and allied products, has been announced by the Federal Telephone & Radio Corp., Newark, N. J., manufacturing associate of the International Telephone & Telegraph Corp. He comes to Federal from the Galvin Manufacturing Corp., where he was manager of the communications and electronic division.

**L. M. Giannini**, president of Bank of America, has announced the appointment of **Howard C. Pyle** as vice president of the bank in charge of the institution's new oil division.

**Gerald J. Stewart** of Houston, Tex., has been appointed general manager of sales for Tennessee Coal, Iron & Railroad Co., subsidiary of United States Steel Corp. **Fred C. Buck**, Houston, formerly assistant manager of sales for the Texas sales office, becomes manager of sales for the Texas district. **George Young**, formerly salesman in the Dallas office, becomes manager of sales under Stewart in Oklahoma, with headquarters at Tulsa. **Herbert L. Nicholl**, a member of the sales staff, formerly located at Beaumont, succeeds Buck as assistant manager of sales in the Houston district office.

**Lawrence A. Robinson**, for 10 years export manager of Faultless Rubber Co., has been appointed assistant director of exports of American Brake Shoe Co., with headquarters at 230 Park Avenue, New York City. **Homer Parsons** has been named sales representative.

**F. A. Street** has been transferred to Jones & Laughlin Supply Co.'s New York export department, where he will be active in a sales capacity under **Park B. Turner**, manager of this department, located at 230 Park Avenue.

**Howard F. Miller** has been named manager of the petroleum company tire sales department of the B. F. Goodrich Co. Miller succeeds **William Sewall** who has been assigned to special duties.

Oliver United Filters, Inc., announces that **Gordon M. Girdwood** has been transferred from the central division of sales in Chicago to Oakland general offices to fill the newly created position of engineering field representative. He will act as liaison between engineering and sales.

**H. L. Heakin** has been named a district representative for the A. O. Smith Corp., covering northern California, Utah and Nevada, and will establish headquarters in San Francisco.

Lincoln Electric Co. announces the opening of a direct factory branch sales office in St. Louis, under direction of **B. J. Brugge** as welding engineer and district manager of sales and service. The office will be located at 4427 Manchester Avenue.

The magnesium division of The Dow Chemical Co. has organized a cathodic protection sales department. **Arthur Smith, Jr.**, has been named manager, with headquarters in Dow's main office at Midland, Mich. **H. A. Ellis**, who worked with Smith for the past several months, will continue to handle magnesium sales in the St. Louis territory.

Union Wire Rope Corp. announces the appointment of **R. O. Tuxson** as district manager in charge of the Houston, Tex., branch.

Chicago Bridge & Iron Co. has opened a sales office in the Healey Building, Atlanta, Ga. **H. F. Stearns** is in charge of the new office.

Patterson-Ballagh Corp. is completely reorganizing plant layout for increased efficiency and has added 15 new presses which will increase production 75 per cent.

Appointment of **W. E. Dueringer** as assistant sales manager, and **H. E. Weaver** as proposition department manager has been announced by **H. M. Hammond**, general sales manager of Bailey Meter Co., Cleveland, Ohio. Both Dueringer and Weaver have been associated with Bailey for over 25 years in various engineering and sales capacities.

The Edward Valve & Mfg. Co., Inc., East Chicago, Ill., has appointed Leatherman & Mertz as its representatives for all of Michigan, excluding the upper peninsula.

Bethlehem Supply Company is erecting a central warehouse at Craig, Colo., from which it will serve all the principal oil fields in western Colorado, including Moffat, Wilson Creek, the new Rangely field, and the large number of wildcats now drilling in that area. **H. V. Harder**, formerly district manager at Wichita Falls, has been transferred to Craig as district manager for Colorado and Wyoming district. This district will come under the general supervision of **V. W. Bailey**, division manager, who is located at Tulsa.

Indiana Equipment Co., Inc., 327 West Market Street, Indianapolis, has been appointed distributor in central and northeastern Indiana for Bucyrus-Erie ⅜ to 2½-yard shovels, draglines, cranes. With the exception of Lake, Porter, and LaPorte counties in the northwest, their territory includes all of Indiana north of (but not including) the counties of Knox, Daviess, Martin, Lawrence, Jackson, Jennings, Ripley, Dearborn. A. E. Hudson Co., Peoria, Ill., will handle this well-known line of excavating equipment in central Illinois. Their territory includes the region south of (and including) the counties of Henderson, Warren, Knox, Stark, Bureau, LaSalle, Grundy, Ford, Iroquois and north of (and including) Hancock, Schuyler, Cass, Menard, Logan, Macon, Moultrie, Cumberland, and Clark counties.

**Andrew C. Temmel**, veteran Texas and Oklahoma oil-field service engineer of National Tube Co., has been named manager of engineering sales service for this United States Steel subsidiary. His headquarters will be in Pittsburgh, Pa.

Pratt Bit & Tool Co. is moving complete welding, blacksmith, and machine shops from Pratt, Kan., to Rangely, Colo

**M. D. Gilbert**, district manager for the Tulsa office territory of Pittsburgh Equitable Meter Co.—Merco Nordstrom Valve Co., has announced the transfer of **Dean Collins**, service engineer, from Tyler, Tex., to Shreveport, La.

F. A. STREET

HOWARD MILLER

G. M. GIRDWOOD

H. L. HEAKEN

B. J. BRUGGE

ARTHUR SMITH

XUM